ELECTRICAL REVIEW

8th FEBRUARY 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CL • NO. 3872

Unit Generating Plant

THE tendency for the reliability of large modern boilers to match that of turbo-alternators makes feasible the economically attractive one-boiler one-turbine combination, as adopted for more than one-third of the present B.E.A. 13,000 MW programme. In later years this unit arrangement will no doubt predominate and the balancing of the least expensive layout and operation against the highest standard of supply has therefore become of the first importance. The I.E.E. paper of Messrs. Bryan Donkin and P. H. Margen, reported in this issue, was, we believe, the first attempt to analyse the main principles involved in relation to a tightly linked electrical system such as the British grid.

The mathematical background of the paper, with its presentation of statistical assessment of risks, provided, in our view, the correct approach to the subject. Although no rigid solution of the problems raised is possible, it gave a valuable " proximate analysis " of the main constituents and a guide to individual judgment, which is indispensable for weighing the influence of innumerable variables on any given conditions. Nevertheless, while the quantitative deductions drawn by the authors may in some instances be regarded as illustrative only, they appear close enough to those suggested by experience to support their main contentions as to the most suitable ratings and groupings of boilers and turbo-alternators and the reserve to be provided both inherently and by the grid. The cost of steam interconnection between units is small in proportion to the flexible margin of reserve it allows. Unfortunately the same freedom from undue complication does not hold where the reheat cycle is adopted, so that isolated unit operation seems then necessary.

The discussion brought into debate some of the uncertainties that must be taken into account. Possibly the most dubious of these concerns the consistency and suitability of coal and the relation of the delivered cost to site positions. The different overhaul

and maintenance periods required for boilers and turbines present a decisive factor in timing. Effects of higher steam temperatures, two-shift operation, stand-by auxiliary plant, and manufacturing facilities in relation to the need for rapid commissioning of power stations furnish examples of other matters in which more data are required. Moreover it is questionable, as the authors imply, whether, with the load densities likely to be found a few years ahead, even 100 MW will be large enough as a standard rating, and possible developments in this direction have now to be considered.

JOB CONTROL

Persuasion, not " direction," is to be employed in guiding people from " non-essential " industries to others of greater national importance. This is the object of the Notification of Vacancies Order made last week. With certain exceptions, as from 25th February, men and women may be engaged only through Employment Exchanges or " scheduled employment agencies." The exempted classes include men and women in managerial, professional, administrative and executive capacities. So far as we have been able to ascertain from the Ministry of Labour and National Service electrical engineers are not specifically excluded from the scope of the Order; much of course depends upon the nature of their jobs. Positions can still be freely advertised but it must be clearly stated that engagements can be made only through the agencies specified.

RESTRICTED HIRE-PURCHASE

Two methods (apart from prohibitive purchase tax) are being adopted by the Government to limit the sale of domestic equipment: the restriction of available materials and more onerous hire-purchase terms. The first method will have the most serious effect upon the domestic electrical appliance business. The stipulation of higher deposits and shorter payment periods in hire-purchase agreements will, however, curb sales of a number of the larger appliances. Some satisfaction may be felt at the exemption of cookers and wash-boilers from control, but on the whole the new Order constitutes another blow for the domestic electrical appliance industry. That industry has been successful in increasing its exports in recent years; now it must rely still more on this trade for its existence—which, of course, is the Government's intention.

HOURS OF WORK

Shorter working hours are a legitimate aim in a civilized community when mechanical aids enable output to be maintained or increased in a given time. But if mechanization fails in this respect because operators do not employ it properly and continuous overtime becomes necessary there is something wrong. Too many demands for shorter hours are made with more overtime at higher rates in mind. That was one of the points made by Mr. S. N. Watkins at the Electrical Contractors' Association dinner last week. Occasional overtime to meet abnormal demands is justifiable but extra hours devoted to normal work add to costs and, where exports are concerned, reduce the country's competitive ability.

WASTED MATERIAL

One wartime phenomenon was the appearance in shops of electrical appliances of a doubtful character produced at a time when reputable manufacturers were unable to obtain sufficient material to satisfy the public demand. Mr. Watkins drew attention to a continuation of this business now that materials are again becoming unavailable to manufacturers. We agree with him that the materials and manpower absorbed in the production of cheap and nasty equipment should be put to better use.

Railway Electrification

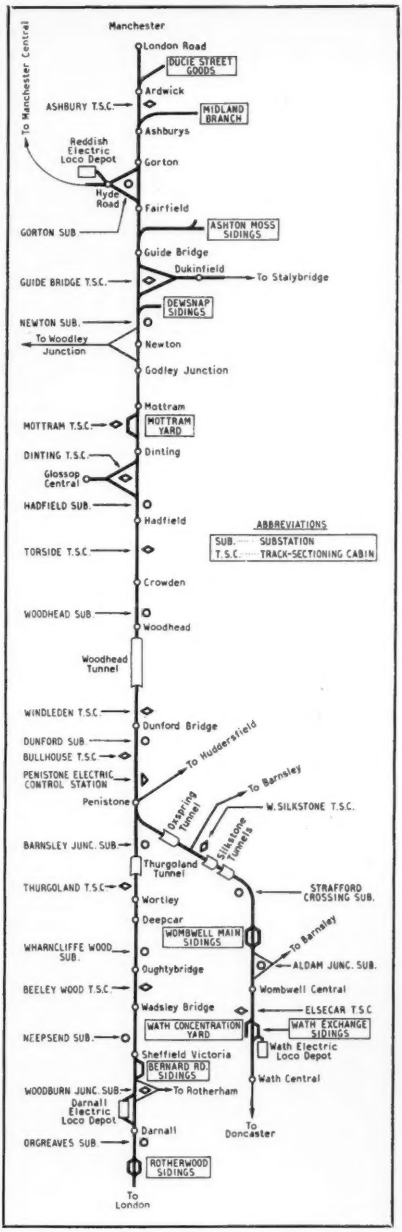
First Stage of Manchester–Sheffield Scheme Completed

SINCE 1947 steady progress has been made with the 1,500 V d.c. overhead line electrification of the whole of the railway from Manchester (London Road) to Sheffield (Rotherwood Sidings), together with branches to Manchester (Central) via Fallowfield, Glossop and Wath (see *Electrical Review*, 24th February, 1950, p. 363). The first stage of this scheme, which covers 20 route miles from Wath to Dunford Bridge, including 75 miles of electrified main line and sidings tracks, has now been completed and was officially opened for commercial freight operation on Monday last, 4th February.

Every day the marshalling yards at Wath receive and despatch thousands of tons of coal to various destinations in the North-West. The heavy mineral trains were previously drawn up the 850ft climb to the top of Dunford Pass (which has gradients of 1 in 40) by two steam locomotives, with two others acting as bankers on the severe gradients. The electrified service is expected to need only one hauling and banking locomotive, effecting a substantial saving in crews and fuel costs. Additional fuel economies will also result from the use of regenerative braking.

Power for operating this electrified section of the railway is supplied from the British Electricity Authority's substation at Aldham and distributed at 33 kV by cables routed along the tracks interconnected to Railway Executive substations at Aldham Junction, Strafford Crossing, Barnsley Junction and Dunford. Each of these substations, for which the main contractors were Bruce Peebles, Ltd., contains e.h.v. outdoor switchgear for controlling the power supply between distribution feeders and busbars and between busbars and the outdoor step-down transformers associated with the rectifiers. The sub-contractors for the substations were A. Reyrolle & Co., Ltd., the British Thomson-Houston Co., Ltd., and Standard Telephones & Cables, Ltd.

Mercury arc rectifiers are used for the conversion of the a.c. power to 1,500 V d.c. for the overhead conductor system. Three of the substations each contain two twelve-anode steel tank rectifiers, the fourth at Barnsley Junction being equipped with three units. Each of the rectifiers is rated at 2,500 kW and is capable of carrying overloads up to 10,000 kW; the total installed capacity of this section of the line is 22,500 kW. The substations are equipped with control cubicles containing protective



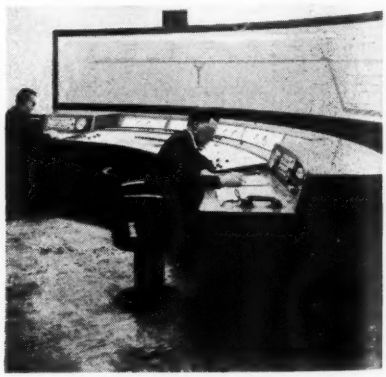
relays, local control switches and supervisory gear for remote control together with d.c. smoothing equipment and auxiliaries. The 1,500 V d.c. supply to the overhead lines is switched and protected by high-speed circuit breakers and track sectioning cabins also containing high-speed circuit breakers are situated between most substations to limit voltage drops and enable faults to be cleared with certainty. The substations at Strafford Crossing and Barnsley Junction are also equipped with electronically controlled resistance banks capable of absorbing 900 kW from regenerative braking if there is no load on the system to absorb the current.

The substations and track sectioning cabins are normally unattended and are supervised from the central control station at Penistone over pilot cables. As in the case of the substations the main electrical contractors for the control station were Bruce Peebles, Ltd. The control equipment comprises an indicating master control panel which may be switched as required to any substation or track sectioning cabin for operational purposes and indication of the position of the equipment therein.

The main Standard Telephones control desk and diagram are housed in the control room, while the associated relay and switching apparatus and batteries occupy adjacent rooms. The illuminated mimic

Left: **Arrangement of the complete Manchester-Sheffield-Wath railway scheme showing disposition of the substations and track sectioning cabins**

Below: **General view of the control room in the central control station at Penistone**



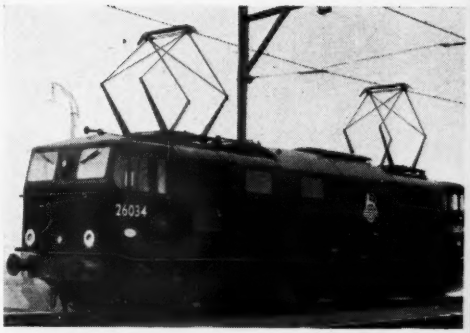
dia m is manually dressed on information sup ed by the master control panels by me of keys fitted on the central " set up " pan which is equipped at present to ha le only the existing remote stations. Ini lly the supervisory system is equipped to andle 23 remote stations (11 sub-sta ns and 12 track sectioning cabins) bu he control desk and common equip-me have capacity for 36 such stations.

e switching equipment consists entirely of lephone type apparatus operating at 50 d.c. and selective signalling is by d.c. im lse trains as normally used in telephone pr tice. but with the addition of special saf uards against corrupt codes causing ma operation. This ensures that the eq pment either does the right thing or no ing at all.

To facilitate maintenance and inspection, the equipment is mounted on telephone type jack-in panels, which may instantly be removed or replaced so that in the event of a fault developing in any panel it may be removed from service, replaced by another and then repaired at convenience.

For " on request " metering of rectifier load and the e.h.v. and d.c. busbar voltages two electronic impulse modulated telemeters are used. Coupling between busbars and the telemeter units is by a method which effectively isolates the metering equipment from the 1,500 V d.c. supply.

As previously mentioned the various substations are linked by Henley 33 kV and Standard Telephones pilot cables. These

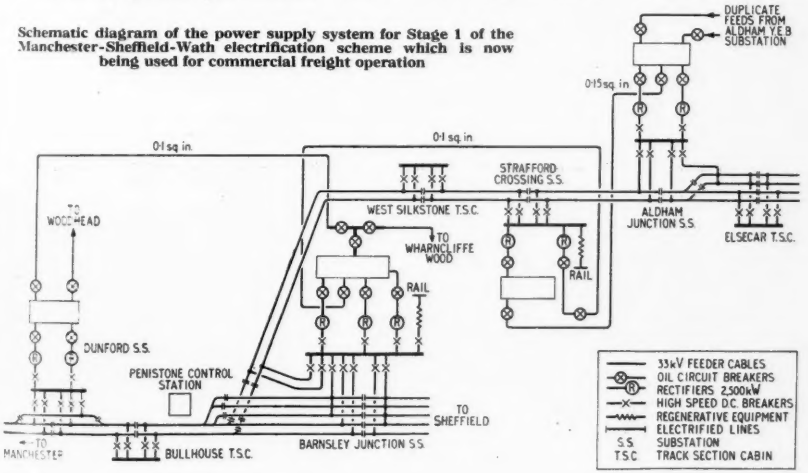


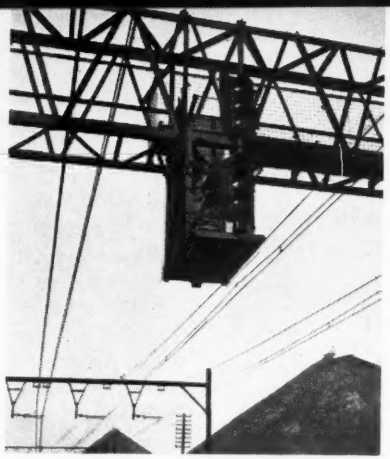
One of the thirty 1,800 h.p. locomotives now being used

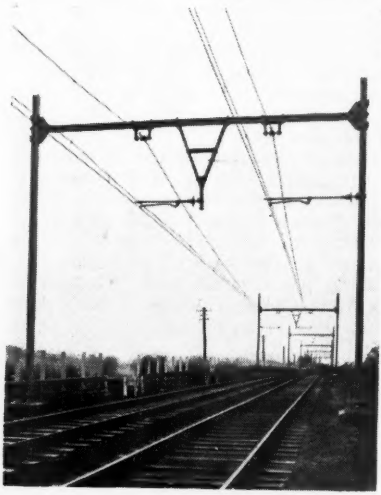
are of the three-cored screened, single lead, single wire armoured and served type in the case of the 33 kV power cables, and of seven and four star quad types in the case of the pilot cables. They are normally carried on cast iron hangers mounted on concrete posts adjacent to the track with the addition of creosoted wood batons to give additional support to the pilot cables. Where there are obstructions the cables run in pre-cast concrete troughing laid with the lids at surface level. Cables cross the tracks through asbestos cement ducts laid in concrete at a depth of 3ft 6in below sleeper level.

The section of the track between West Silkstone Junction and Wath is subject to

Schematic diagram of the power supply system for Stage 1 of the Manchester-Sheffield-Wath electrification scheme which is now being used for commercial freight operation







subsidence because of underground colliery workings. Special precautions have had to be taken in installing the cables in this area. As a result of two years' observation on an experimental cable route, special long reinforced concrete posts have been installed and the cables are carried in asbestos covered steel troughing mounted on these posts. Concrete cable bridges are inserted in the troughing midway between the post positions; arrangements are also made for slack cable to provide for subsidence of the track crossings.

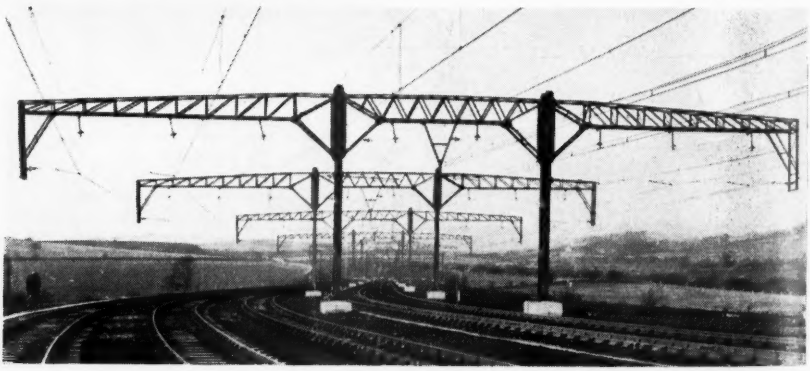
The longest continuous run of 33 kV feeder cable installed on this stage of the scheme is the 583 yd length laid through Oxspring Tunnel where restricted clearance did not permit the making of a straight through joint. Barrier joints are installed in the 33 kV cable where it traverses the 1 in 40 gradient of the two miles long Wath bank. Near the Railway Executive substation at Aldham Junction, the 33 kV cables (one feeder and two supply cables from the B.E.A. substation) and the associated pilot cables have been carried temporarily on double and single catenaries pending the replacement of the existing bridge over the Dearne and Dove Canal.

The overhead line equipment is of the compound catenary type having a total copper equivalent section of 0·75 sq in and is designed to operate at 1,500 V d.c. The

Top left: **Colour light signal on combined overhead line and signal structure carrying Barnsley Junction "up" main home signal and junction indicator**

Left: **Portal structure made from broad flange beams supporting equipment over two main line tracks**

Below: **Cantilever overhead line structures at Wombwell Main Junction sidings**



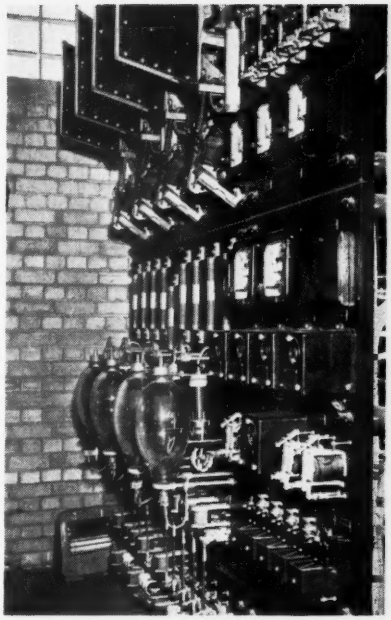
design and construction of this equipment has been carried out by British Insulated Callender's Cables, Ltd., and its subsidiary, British Insulated Callender's Construction Co., Ltd.

The major part of the route lies through areas where ground subsidence is liable to occur due to colliery workings and this presented many original problems to the designers. When subsidence occurs the tracks are packed up by the railway engineers to maintain correct grading, so provision is being made in the design of the structures to mount the height of the conductor wire relative to the tracks. For this purpose all masts, bridges and cross-spans in the subsidence areas have been made adjustable, and the foundations and structures have been designed to withstand the additional stresses which will occur when the equipments are raised.

Where the number of tracks does not exceed four, steel portals constructed from broad flange beams are used to support the equipments. Where there are more than four tracks lattice type structures are generally used except in subsidence areas where advantage has been taken of the more easily adjusted cross track catenary (head span) construction.

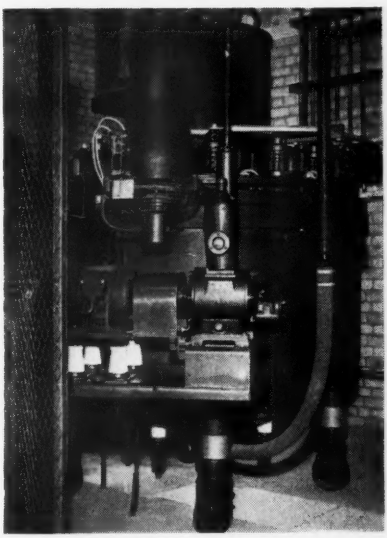
A total of 65 locomotives is being provided for the electrification scheme, of which 58 will be of the double bogie four-motor, four-axle type having a continuous rating of 1,360 h.p. at 56 m.p.h. and a one hour rating of 1,868 h.p. at 45 m.p.h. For the first stage of the scheme 30 will be put into service. The remaining 27 locomotives will be of the double bogie, six-motor, six-axle type having a continuous rating of 2,298 h.p. at 46 m.p.h. and a one hour rating of 2,490 h.p. at 44·3 m.p.h. The performance of the two types will be identical on the lower speed combinations and both will handle the heaviest freight trains.

The mechanical parts of these locomotives are being built by the Railway Executive at its Gorton Works while the electrical equipment is being installed at Dukinfield by the Metropolitan-Vickers Electrical Co. There will also be eight three-coach multiple unit trains identical with those on the Liverpool Street–Shenfield line except that first and third class accommodation will be provided. In this case the coaches are being built by the Metropolitan-Cammell Carriage and Wagon Co., Ltd.,



Regenerative room in Barnsley Junction substation

One of the steel tank rectifiers in Barnsley Junction substation



and the electrical equipments for these are being supplied and erected by the General Electric Co.

The 30 locomotives to be used at present are each equipped with four 450 h.p. axle mounted motors giving a maximum traction effort of 49,000 lb and the maximum service speed is 65 m.p.h.; regenerative braking is provided for the control of heavy trains on down gradients. In 1947 the prototype of these locomotives, L.N.E.R. No. 6000, was sent to Holland for trials and service on the Netherlands Railways, and is still running there, having covered about 325,000 miles hauling express passenger and freight trains.

Largely as a result of this service in Holland a number of improvements have been made to the layout of the electrical equipment, notably in the driving cabs which have been enlarged. The master controller, instruments and other cab equipment have been built into an attractive sloping desk and inclined instrument panel resulting in added comfort and ease of control for the driver. Electric window heaters have been added in front of the driver to maintain clear vision.

Vokes type dry air filters have been fitted to all ventilating louvres to maintain a clear atmosphere inside the body and thereby reduce maintenance on the electrical equipment; cooling air for the traction motors is drawn from inside the body.

Regenerative Braking

For the first time on British Railways regenerative braking is being used in commercial service. All of the locomotives are fitted with the necessary equipment to enable regenerated energy to be fed back into the contact system when trains are being worked down heavy gradients existing on this stretch of the line. The advantages are improved control of unbraked trains leaving the brake blocks cool, reduced wear on the brake blocks and reduction in overall energy consumption.

With regard to the signalling, all existing d.c. track circuits in the area have been converted to a.c. working and of the condenser fed type of double rail impedance bond or of single rail form as necessary. All distance signals on the main lines have been converted to colour light type and moved out to give increased braking distance. Where a distance signal was carried below a stop signal the latter has also been converted and the two combined in one colour light signal. In some instances it has been necessary to erect the new signals on the traction overhead line equipment structures which have been specially designed to carry them in cages suspended therefrom. Colour light signals have also replaced the existing semaphore signals in certain cases where it was found that the overhead line equipment obstructed the view.

In connection with the provision of locomotive exchange facilities at Wath, Elsecar Junction and Wombwell Main Junction, new colour light signals have been installed. Points situated beyond the mechanical working distance have been fitted with electrical point machines operating on 110 V d.c. At Wombwell Main Junction and Elsecar Junction the electrically operated points, together with the colour light signals, are worked from small panels fixed over the centre portion of the mechanical lever frames and electrically interlocked therewith. A new 90-lever mechanical frame has also been installed at Barnsley Junction signal box in connection with additional loco facilities which have been provided.

In the Penistone area it was necessary to convert a number of signals to colour light type in order to dispense with the semaphore signal gantries and brackets which prevented the traction catenary equipment from being erected. Throughout the area it has been necessary to make a number of alterations to signalling equipment in order to make way for the overhead line structures.

The new signalling and track circuits are supplied with power taken from the traction substations and distributed throughout the area at 660 V, stepped down to 110 V at the various signal locations, etc., as required. Standby power equipment has been provided at Aldham for the Wath area in order to provide a signalling supply in the event of a serious fall in voltage or frequency of the incoming supply. The set consists of a 40 h.p. diesel engine directly coupled to a three-phase alternator, having an output of 25 kVA at 415 V. The normal supply from the traction substation is at 415 V, three-phase, and is transformed to 660 V single-phase by three-phase to single-phase transformers.

VIEWS on the NEWS

By REFLECTOR

SOMETIMES the economics of the *Economist* pass all understanding. For some time it has contended that electricity is too cheap and too easy to obtain and now it recommends the imposition of a tax to remedy this uncommon unorthodoxy. Of course, it says, this would fall particularly heavily on people with all-electric homes but as they are using the largest amounts of a scarce resource (in effect) it would just serve them right. I should have thought the *Economist* would have discovered by this time that electricity is not a scarce resource for most of the day and night. But should its pontifications be taken seriously when it goes on to suggest that our exported capital goods are also too cheap and steel should be taxed to increase their price to overseas buyers? Is this a helpful contribution to our export drive?

* * *

A fortnight ago I mentioned a suggestion that sheet steel should be used instead of cast iron in order to conserve metal. The thought arose from an allegation by the British Iron and Steel Federation that too much pig iron was going to the foundries. This has been strongly denied by the Council of Ironfoundry Associations which says that the foundries are running down stocks and working on a hand-to-mouth basis. It points out that the Federation does not speak for all the iron interests and says that the fall in steel production is not due to the consumption of the foundries. The Council also brings in a point which I made: that a change-over to steel sheet is by no means a simple matter for the manufacturers who now employ castings even if the substitution is possible.

* * *

Simplification of electricity tariffs is bound to have adverse results here and there. In a letter to the *Evening Sentinel* (Hanley) the hon. secretary of an Old People's Welfare Committee says that a home which it runs will have to pay over three times as much for electricity because of simplification. The Midlands Electricity Board, he says, does not regard the establishment as "domestic" and it certainly is not "industrial." It must therefore be "commercial." The Board has replied that the annual increase will not be so great as is suggested, but it realizes that the case presents difficulties. I am glad to see that the matter is to be discussed in an endeavour to find a compromise. The Board says that it is anxious to give all consumers the best possible service.

* * *

It is pleasant to meet again men who have been responsible for building up the electrical industry and are now in retirement. Many of them still share with the industry its characteristic vitality and vigour although they are advanced in years. The other day I had the pleasure of Mr. C. W. Sully's company at a small Press gathering. Mr. Sully retired from the directorship of the Electric Lamp Manufacturers' Association in 1938 and is well over eighty, but he is still alert and interested in electrical affairs. The occasion was a report on progress by the Lighting Service Bureau when Mr. E. B. Sawyer, the manager, justly claimed that the work of the Bureau had had a profound influence in the improvement of illumination in a wide variety of directions. It is active in the provinces as well as London with establishments in Glasgow, Leeds, Birmingham and West Hartlepool. Mr. W. J. Jones, who was Mr. Sawyer's predecessor as manager and succeeded Mr. Sully as E.L.M.A. director, was in the party as a genial link between the two.

* * *

A correspondent in the electricity supply industry has sent me an extract from an advice note received, he says, from a well-known cable firm:—

"C.I. boxes for l.t. 4-core ·5 sq in cable entering and leaving at opposite ends." This method leads to less congestion than having a common entry and exit of course.

Electrical Contractors Dinner

Labour and Material Difficulties

MR. STANLEY N. WATKINS, the President, took the chair at the annual dinner of the Electrical Contractors' Association and its allied organizations, N.E.C.T.A., Ltd., and the National Federated Electrical Association, at Grosvenor House, London, W, on 29th January. The company of about 700 included many distinguished guests headed by the Rt. Hon. Sir Walter Monckton, Minister of Labour and National Service, who proposed the toast "The Allied Associations and Honorary Officials."

In his speech Sir Walter Monckton dealt with the present situation of the country and the means by which it could pay its way. He said that cuts in imports and capital investment were essential and exports had to be stimulated if we were to maintain or improve our standard of living. Only greater productivity could save the country; the best use had to be made of material and men.

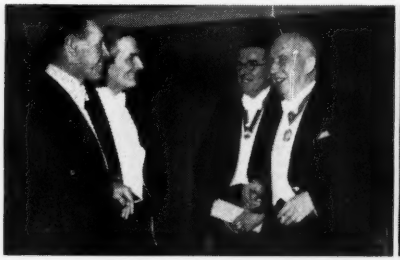
First it was necessary to steer the available labour to the more essential industries through the Employment Exchanges. These exchanges were human agencies able to give useful and sensible guidance. This was the object of the Order which he had laid before the House of Commons that afternoon; the aim was persuasion, not compulsion. Age limits of 60 for women and 65 for men would encourage employers to engage the older workers. He was anxious that everything should be done to train not only young workers but to improve and widen the scope for older men and the National Joint Advisory Council had approved an approach on these lines industry by industry. Sir Walter said that the electrical industry had a good record in the encouragement of apprentices and would undoubtedly consider enlargement of the scope.

Improvement of productivity was not merely a question of enlisting skills and personnel management; it required a definite attitude of mind. A will to succeed and a desire for an efficient partnership of all men of good will would restore this country's position. Although the Government realized the seriousness of the situation it had no doubt that it could be overcome and in that work he relied on the help of the Allied Associations.

Mr. Watkins responded to the toast. He said that the Association's members were already making a contribution to the defence demands imposed upon them and were also undertaking substantial contracts for houses, schools and hospitals, as well as installations for the Services and atomic centres.

He assured the Minister of his members' co-operation but asked him to ensure that there was no wastage of skilled labour such

Left: Messrs. A. F. Plummer, M. R. H. Sadler, W. T. Trace and the President. Right: Mr. P. V. Hunter, Mr. L. C. Penwill (director), Sir John Hacking and Mr. W. K. Brasher



1. Sir Walter Monckton and the President. 2. Mr. E. C. Holroyde. 3. Alderman W. Lewis, Mr. W. A. Gazard (speaking) and Mr. C. Hughes

as occurred during the war. They had obtained evidence showing that in many instances for every five electricans employed in factory maintenance work efficiency and economy justified only one. Mr. Watkins also asked the Minister to select carefully the approved agencies through which an employer could obtain his labour requirements. Without attention to these points efforts to secure full use of the country's manpower would be frustrated.

Speaking of materials, the President said that fifteen months ago the Association had warned the appropriate Government Department of the impending shortage of steel conduit but control was only to begin on 4th February. The director of the Association had accepted the rather thankless task of allocating to the industry the entirely inadequate supplies of conduit available. If steps had been taken in time vast quantities of conduit used for non-essential services could have been conserved with considerable advantage to the community. Many bodies, including Government Departments and local authorities, were still specifying the use of steel conduit in cases where it was not essential. He urged that future specifications should not call for conduit when other systems could be safely employed and that even in projects already authorized specifications should be changed whenever it was possible and reasonable to do so.

Mr. Watkins went on to deal with the waste of material represented by the production of cheap and shoddy electrical equipment. Scarce labour and materials should be used only for the production of safe and lasting equipment. He also pleaded for the removal of unnecessary controls which wasted so much time in industry.

As regarded the shorter working week, Mr. Watkins said that it had been his members' experience that the reduction of normal hours was not accompanied by the promised equal or greater production. That had proved possible of achievement only by a working week of between 50 and

Left: Messrs. E. A. Reynolds, A. E. Iliffe and H. M. Drake. Right: Messrs. P. G. Wallis, N. Aish, S. Dickinson and T. E. Alger

54 hours which added to the cost of production and tended to prejudice our chances in export markets. In present circumstances everybody from the chief executive to the youth who had just left school should make his contribution to the country's prosperity by working longer hours at normal rates of pay.

In proposing the health of the guests Mr. A. F. Plummer, vice-president, said that Sir Walter Monckton had a task which not many of them would care to undertake. He playfully divided the guests into two classes—scientific and commercial—and said that Sir John Hacking and Mr. W. K. Brasher (I.E.E.) would appear to be the only representatives of the former class, unless Messrs. C. Hughes and W. J. Jones, of E.L.M.A., could now be included. Mr. Plummer also referred to the presence of Col. B. H. Leeson (director of B.E.A.M.A.) and representatives of other industrial and trade associations; to Major J. L. Drummond and J. Smellie (E.C.A. of Scotland); Mr. C. R. Nilsson (E.C.A. of Australia); Mr. P. V. Hunter (chairman of the National Inspection Council Organizing Committee); Mr. F. Long, secretary of the B.E.A.; and four Electricity Board chairmen (Mr. L. Howles, Ald. W. Lewis, Mr. C. T. Melling and Mr. H. Nimmo). All of them, Mr. Plummer said, were doing their best to serve and develop the acquaintance of their fellows in the electrical industry.

In the course of his reply to the toast, Sir John Hacking, President of the I.E.E., said that co-operation between the Institution and the E.C.A. was close and of long standing. Contractors had held high office in the I.E.E. (here Sir John referred particularly to Mr. H. T. Young who had been President of the Institution) and were well represented on the Wiring Rules Committee. Sir John said that 47,000 copies of the 12th edition of the Regulations had been published and an abridged version had been produced for men doing straightforward jobs on domestic premises. He asked for suggestions for the 13th edition which was now being prepared.

The I.E.E. regretted that the E.C.A. had felt unable to continue to support the National Register of Electrical Installation Contractors. He would not contest the E.C.A.'s view that compulsory registration was preferable but compulsion was not usual in our national life; voluntary co-operation was the rule. He hoped that in this matter the Association was not following a "Jack-o'-lantern."

Mr. E. C. Holroyde, as chairman of the Cable Makers' Association, also replied to the toast. He said that it was unusual, but pleasant, to be entertained by one's customers. It emphasized the cordial relations which existed in the industry. That industry was one of the finest organizations ever built up; all sections fitted into the overall picture in a manner of which all could be justly proud. Even shareholders and customers sometimes appreciated this.

It was a good thing to have a Government which was prepared to take the steps essential to put this country on its feet. He believed that even more drastic measures would have to come. As the immediate past-president of the Electrical Industries' Benevolent Association, he expressed appreciation of the help received from the E.C.A. The present hard times made the E.I.B.A. more necessary than ever.

Mr. Holroyde concluded by expressing his conviction that although the industry had its difficulties they would be overcome and that the close co-operation between the E.C.A. and the C.M.A. would continue.

The health of the President was proposed by Mr. W. A. Gazard, and Mr. Watkins responded.

Institute of Metals Competition

THE Council of the Institute of Metals is to present annually two prizes of twenty guineas each for the best essays submitted. Each prize will be in the form of ten guineas in money and ten guineas in scientific, technical or other appropriate types of books, to be selected by the prizewinner.

The competition is open to all student members of the Institute, and to all associate members of Local Sections who are eligible for student membership of the Institute provided that both are within the normal age limits for student membership (17 to 25 years). For the 1952 competition candidates may select either "Non-Ferrous Foundry Practice," or "Metallography in Industry" as the subject. One prize will be given under each subject. Entries must be submitted to the Secretary, the Institute of Metals, 4, Grosvenor Gardens, London, S.W.1, from whom further particulars of the competition can be obtained, not later than 19th May next.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Industry's Duty to the Public

MR. J. N. WAITE'S article (25th January) is—as one would expect—of great interest, dealing as it does with a subject of importance to the British Electricity Authority, and to all consumers supplied by the various Area Boards.

It is a pity that Mr. Waite, who wrote much with which most people will agree, should have thought it necessary, or fair, to say of those who have criticized electric heating that "there is a fair amount of hypocrisy behind such criticism." In all probability I hold the position of leading critic of electric heating, but as a friend of the industry and not as a hypocrite, for no hypocrite is likely to complain that he is paying insufficient for certain poor load factor heating supplies. Subject to qualification, such as safeguarding the true interest of the country, the view I have always held I cannot put better than Mr. Waite, who writes: "So long as the consumer is willing to pay the true costs of the service used, he should be allowed complete freedom to use the service to suit his own needs." To my mind, nothing could be fairer or more sensible, but it is not being done, for a great deal of load represented by short-period heating during unusually cold weather has an average load factor not exceeding 6 per cent or, say, 525 kWh/kW of annual m.d. and is not bearing "the true costs of the service."

It may be necessary to say that diversity has not been overlooked and that electricity now being sold at a loss by Area Boards is serving demands which, during cold spells, come on top of the ordinary demands and have negligible diversity. The proof of this is the jump in demand during unusually cold weather.

Put at a low figure, the capital outlay to serve each kW of m.d. will be not less than £63, while the total cost of generation, distribution depreciation and servicing of such capital, if taken at 8 per cent, means that 525 kWh will cost the suppliers, say, £5.

Tariffs just now are about: for the first 10 kWh a room, quarterly, 5d/kWh and for the remainder, quarterly, 1d/kWh. If, therefore, as in my case, the ten kWh a room per quarter are used for ordinary purposes, the balance of 525 kWh charged for at 1d/kWh will bring in £2 3s 9d and a loss of £2 16s 3d per kilowatt of demand will result. That loss must be borne and the good consumer bears it.

Mr. Waite mentions current limiting devices, but, although they have merits, it is likely that m.d. indicators would be more suitable, with charges based on load factor. That the present system of charging is unfair is indisputable and, although current limiting devices may be costly, m.d. indicators are not.

London, W.1. A. J. FIPPARD,
Chairman,
Electric Supply Corporation
(Overseas), Ltd.

Generating Plant v. Load Control

I HAVE studied Mr. J. N. Waite's article (25th January) with the keenest interest. With all deference that one must accord to such an eminent authority on this subject, I cannot refrain from making some observations, which, I hope, will mitigate the revulsion of feeling that he and many of his contemporaries have to the suggestion of load control.

Mr. Waite agrees that load spreading with its attendant inconvenience must obtain speedy relief and, given the necessary official priority and materials, sufficient relays could be made in half the time needed to commission new generating plant. If (as he suggests) priority is given to new plant, greater demands will automatically be thrown on to the already overburdened coal industry.

In view of official exhortations to retrench, would it not be better to offer a solution and a reduction of the financial and physical strains on the national economy simultaneously? This might be

achieved in a large measure by load control, for the writer has first-hand knowledge of a relay which could be produced for £3 and should not cost more than £1 to install—an immediate saving of £27 million on Mr. Waite's estimate.

Raw material shortages also demand close scrutiny. A thousand load control units can be made from 2½ cwt of copper and, if each of these clips only 1 kW from the peak, it compares very favourably with the amount of copper required to generate and distribute 1,000 kW.

While meeting the immediate needs of the industry, these units also cater for the long-term conditions recommended by Mr. Waite when he asserts that " so long as the consumer is willing to pay the true costs of the service used, he should be allowed complete freedom to use the service to suit his own needs."

The economically sound operation of this scheme demands a form of supervisory control to ensure that a consumer obtains only that service for which he has paid. The load control unit, which can be set at an amount commensurate with the charge, would exercise a precise degree of supervision and might in some years, conceivably, replace the existing meter. In this eventuality meter reading and accounts staff could be very considerably reduced and switched to a productive occupation, increasing still further the economy and efficiency of the supply industry.

New Malden, Surrey.

W. A. DEVON,
London Area Manager,
Venner, Ltd.

The Right Perspective

MR. SZWANDER in your issue of 18th January assumes that by restricting the demands of individual consumers at times of peak loads on generating stations, the load factor of a system will be improved. He does not state when he expects peak load, but whenever it occurs his proposal is to disconnect the total supply to domestic, commercial and industrial consumers if their combined loads exceed a predetermined figure. As very few people, if any, in the supply industry can forecast when the peak load will occur a month beforehand, we cannot expect a consumer to be able to do so. It does not need much imagination to visualize the reaction of domestic consumers if meals are spoilt and that of industrial consumers when factories are shut down at unexpected times. The consequence would be that we should lose a lot of business, particularly with domestic consumers, and the revenue per £ of capital expenditure would fall.

However, let us assume that the peak is suppressed by the suggested method. There will then be a peak left at some other time. Do we then endeavour to suppress that also? What is the load factor on the generating stations that we should strive for? I have asked this question many times and have not yet received an answer.

The load factor of a factory working 44 hours a week cannot be better than 26 per cent and that of a domestic consumer with cooker, kettle, wash boiler, water heater and space heating is not more than 6 per cent, yet with a combination of all loads in a well-developed district the weekly load factor at the time of highest demands exceeds 50 per cent.

I would like Mr. Szwander to give an estimate of the percentage of domestic load that would be taken off the peak of the generating station in a district with a saturation of 67 per cent cookers, 67 per cent kettles, 55 per cent wash boilers, 37 per cent water heaters and with a connected space heating load which is very high. With this connected load the average demand on the district busbars at peak, which occurs at mid-day, is a trifle under 1¾ kW per domestic consumer during week-days, with an average consumption of 3,400 kWh per consumer. According to Mr. Szwander's proposals we should allow during restricted periods 67 out of every 100 domestic consumers to have 2 or 3 kW each and the remaining 33 would be permitted to use 0·5 kW. If only half of the consumers with cookers used 3 kW and the remaining 67 used 0·5 kW we should have a load of 132 kW per 100 consumers instead of the peak average of just under 125 kW. It is therefore a little doubtful whether the proposed method of restriction would accomplish its object.

The cost of installing and maintaining restrictive devices would be greater than the cost of installing and maintaining generating plant equivalent to the load reduction which restriction would achieve. The time needed to manufacture and install restrictive instruments will not be less than the time it will take to install the required generating plant to satisfy consumers' demands. Which is the better

thod of dealing with our present-day problem?

seems to me, and I have had about years' experience in the supply industry, it is far better to provide consumers with what they want than to assume that know best and as soon as a consumer ds up his load suggest restrictions.

Our loading conditions are much better they were 40 years ago. This is due he men in the industry who knew their and encouraged new loads. They er talked about compulsory restrictions. may be that peak loads are a blessing disguise. Maintenance work must be on all generating plant and if steady ds were experienced throughout the ar additional equipment would have to installed to enable us to carry out ential maintenance work on all types of gear.

We are in difficulties at present through no fault of anybody in the supply industry. Let us cultivate a desire to serve our consumers, and we shall then soon be in a position to provide supplies at prices which consumers will be willing to pay.

Welwyn Garden City, Herts. B. CROWSLEY, A.M.I.E.E.

Bedroom Heating

IN the article on the above subject (25th January) Mr. A. C. Johnson states that the complete answer to "off-peak" bedroom heating seems to be the oil filled electric radiator. I cannot agree with this assumption. The water filled electric radiator—although not completely meeting the case—is a better proposition.

The specific heat of water is twice that of oil and if the surface temperatures are to be the same, usually 160 deg F, the water filled radiator of similar type will have twice the heat storage capacity.

Glasgow, C.4. DUNCAN W. LOW, B.SC., M.I.E.E., A.M.I.C.E., *Director*, Duncan Low, Ltd.

I.E.E. Birmingham Dinner

SIR JOHN HACKING, President, said at the annual dinner of the South Midland Centre of the Institution of Electrical Engineers at the Grand Hotel, Birmingham, on 2nd February, that power cuts this winter had been less severe not, as some people seemed to imagine, because of political influences but because of the efforts of electrical engineers and manual workers. Another major contributory factor was the co-operation of the Regional Boards for Industry in the matter of load spreading. The amount of plant available had also been increased.

Sir John said that the position had also been relieved because the maximum demand of industry had not risen as had been expected. The demand was about 400,000 kW less than had been planned for. It was to be hoped that there would be no difficulty about continuing load-spreading arrangements next year.

With the reduction in exports by the motor car industry, it was quite possible that the electrical manufacturing industry would become the most important feature of the country's export economy. He viewed this with enthusiasm, but with a certain amount of concern, because the more electrical generating plant that was exported the less would be available for installation in this country. Impressed as he was with the necessity for replacing obsolete plant in this country, he hoped that the home industry would have a considerable proportion of home manufactures.

Turning to the educational work of the Institution, Sir John said it was necessary to ensure an adequate entry of children leaving school into the training schemes of the industry. In this work there was close liaison between the Institution and allied organizations. It was important that the educational courses which entrants to the profession had to take should be combined with practical training schemes.

Maj.-Gen. S. W. Joslin, Director of Mechanical Engineering, War Office, and himself a member of the I.E.E., proposed the toast of the Institution. He asked for the support of the members in recruiting for the reserve of electronic artificers for Anti-Aircraft Command, which was a most important part of the defences of the country. The speaker paid a tribute to the work of the permanent staff of the Institution. The future of the Institution would depend upon the manner in which young men were encouraged to take part in its activities and in this connection the social side was important.

Sir John Hacking, speaking later on Maj.-Gen. Joslin's recruiting appeal, said he hoped that officers in R.E.M.E. would receive training which would qualify them later for civilian occupations. It was a tragedy that Army officers on retirement often had difficulty in finding a proper niche in civil life. The Royal Navy was going a long way towards answering the problem.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. G. P. Belsham** has been appointed a joint managing director of Brookhirst Switchgear, Ltd., of which company he has been a director since 1948. Mr. Belsham was from 1929 to 1940 assistant works manager and from 1940 to 1943 works manager with the Igranic Electric Co., Ltd., and was appointed works manager by Brookhirst Switchgear, Ltd., in 1943. He is also a director of Cantie Switches, Ltd., Bromborough, Ches.

Mr. K. N. Swash, B.Sc., A.M.I.E.E., has been appointed a director of Brookhirst

Mr. G. P. Belsham

Mr. K. N. Swash

Switchgear, Ltd., of which company he has been chief engineer since 1948, having previously been district engineer and manager in Leeds since 1936. He has been associated with the company for twenty-four years.

On St. Thomas's Day last, **Mr. J. Mortimer Hawkins** was elected to the Court of Common Council of the Corporation of the City of London, to represent the Ward of Walbrook.

Following a recommendation by the West Riding Constabulary to the Royal Humane Society, the Testimonial on Parchment combined with Resuscitation Certificate and the Resuscitation Certificate have been awarded by the Society's Committee to **Mr. James Edward Downing** and **Mr. Fred Moxon** respectively. Both men are employed at the British Electricity Authority's Mexborough power station, Mr. Downing as a labourer and Mr. Moxon as a fitter's mate. The incident which earned these awards took place on 20th August last, when a child aged seven fell into the canal near the power station. Mr. Downing hastened to the scene and dived fully clothed into the canal and swam across to the child and succeeded in getting him out of the water. Both Mr. Downing and Mr. Moxon, who had also hurried to the scene of the accident, successfully applied artificial respiration.

Mr. J. V. Daniel has been elected to the board of Crompton Parkinson, Ltd. Mr. Daniel is well known in electrical engineering circles, having been associated with Crompton Parkinson since 1927. He has served as plant sales manager at Nottingham and Manchester, as general sales manager of the plant division, as assistant general manager of the British Electric Transformer Co., Ltd., and in 1948 was appointed to the position of deputy works director for the southern works of the company. Mr. Daniel has been an executive director of Crompton Parkinson, Ltd., since 1946 and in December, 1949, was appointed assistant managing director (works), in that capacity assisting the joint managing directors of the company on works matters. He recently returned from a visit to Australia and New Zealand on behalf of his company.

Mr. J. V. Daniel

Mr. E. F. Embleton has been appointed manager of the Birmingham district office of the Hotpoint Electric Appliance Co., Ltd., in succession to **Mr. J. H. Ratcliffe**, who has resigned. Mr. Embleton has been with the Hotpoint Co. since 1922, and was attached to the head office staff in London until 1950, when he was transferred to the Peterborough Works. Mr. Ratcliffe, who leaves the company at his own request, was previously manager of the company's district office at Nottingham.

Mr. E. F. Embleton

The sales staff of **A. H. Hunt (Capacitors), Ltd.**, has been reorganized and, under the

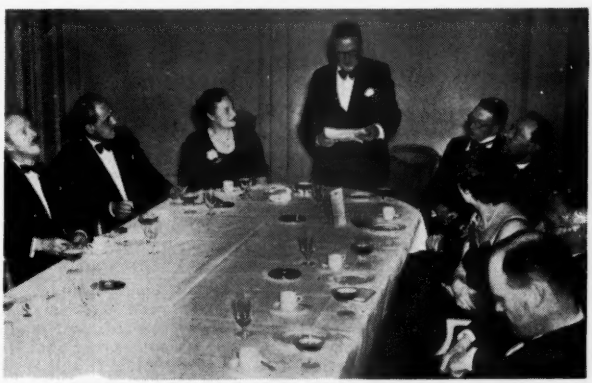
direction of Mr. F. S. Richmond, is now as follows:—Mr. R. C. W. Clarke is responsible for all Government contracts; Messrs. O. G. Cox and E. A. Benwell, hitherto the technical sales representatives in the electronic and industrial divisions, become joint sales managers; sales to service trade, wholesale and retail, are under the supervision of Mr. J. Moor in the capacity of sales manager of this section as hitherto; and Mr. H. E. Campbell is now entirely responsible for publicity.

Mr. A. J. K. Parker has joined the board of F. H. Wheeler & Co., Ltd., and has been appointed managing director. Before taking up his new appointment, Mr. Parker was associated with the companies within the E.M.I. group for twenty-four years and for the past ten years has been works engineer of E.M.I. Factories, Ltd., Hayes, Middlesex. He received his engineering training with the Brush Electrical Engineering Co., Ltd., and at Loughborough College.

Mr. A. J. K. Parker

In this issue the **Eastern Electricity Board** is advertising for a secretary to succeed Mr. A. Bond, who, as we reported last week, has been appointed deputy-chairman of the Yorkshire Electricity Board. A salary of £2,750 a year is offered.

At a dinner party on 25th January given at the Trocadero, London, by members of the E.L.M.A. Publicity Committee, the guest of the evening was **Miss N. E. Miller.** On behalf of the members, Mr. R. E. Hesketh (G.E.C.) presented Miss Miller with an inscribed wristlet watch as a mark of appreciation of her long association with the Committee. Among those present were Mr. W. J. Jones (director, E.L.M.A.); Mr. H. R. Mallett (Siemens), chairman of Committee; Mr. H. E. Goody (B.T.H.); Mr. F. J. Addington Hall (Philips); Mr. McK. E. Tatchell (Ediswan); Mr. E. B. Sawyer (Lighting Service Bureau); and Mr. T. O. Freeth (Lighting Service Bureau).



Left to right, round table: Mr. T. O. Freeth (Lighting Service Bureau), Mr. McK. E. Tatchell (Ediswan), Miss N. E. Miller (Ediswan), Mr. R. E. Hesketh (G.E.C.), Mr. H. R. Mallett (Siemens), Mr. W. J. Jones (director, E.L.M.A.), Mrs. A. R. Bird, Mr. E. B. Sawyer (Lighting Service Bureau) and Mr. H. E. Goody (B.T.H.)

Mr. D. F. Embry, of the Wolverhampton Sub-Area, Midlands Electricity Board, recently received a presentation from Ald. W. Lewis, chairman of the Board, in recognition of his success in three national window dressing competitions. The presentation ceremony was attended by Mr. F. J. Elliott, Sub-Area manager and Mr. H. J. Gibson, chief commercial officer. Displays designed and executed by Mr. Embry obtained the second prize in the Smiths Clocks national competition, first prize in the Hoover competition for electricity supply undertakings, and two prizes in the Festival of Britain Competition organized by the British Display Association.

Following upon the resignation of Mr. H. Nielsen, **Mr. E. C. Davies,** A.M.I.E.E., has been appointed manager of the heavy plant section of the Engineering Sales Department of the General Electric Co., Ltd., with **Mr. G. F. J. Morgan** as his assistant. After serving his apprenticeship with the company, Mr. Davies joined the Engineering Design Department in 1924 and six years later took charge of the d.c. machine section. In this capacity he was responsible for the design of the new ranges of steelworks motors to the standards of the A.I.S.E. and for the development of the G.E.C. cascade exciter control systems for all types of industrial drive. In 1935 he became welding adviser to the company, and has been chairman of the B.E.A.M.A. Technical Committee on Welding since 1940.

Mr. Morgan served his apprenticeship with the G.E.C. after which he joined the company's Contract Department at Witton as

an erection engineer on the installation of electrical plant at the Ebbw Vale Works of Richard Thomas & Baldwins, Ltd. In 1941 he transferred to the Plant Progress Department of the Iron and Steel Control, and a year later joined the Royal Air Force where he served as an officer in the Technical Branch (Electrical) until he was demobilized in 1946. He then joined the Steel Company of Wales, Ltd., and in 1949 was engaged by McLellan & Partners as electrical engineer for the plate and sheet finishing and cold mills at the Abbey Works. He rejoined the G.E.C. in January this year.

Mr. E. G. Fell has been appointed export sales manager and assistant to the associate director of export, Enfield Cables, Ltd., as from 1st January. He will work from Victoria House, Southampton Row, W.C.1. Mr. Fell joined Enfield Cables in 1945, after twenty-two years in the cable department of Siemens Bros. & Co., Ltd. He was one of the first members of an early cable apprenticeship scheme, and served in the test, estimating and designs departments. During the war he was engaged on special development work.

Mr. E. G. Fell

Mr. J. S. Pickles, who was appointed chairman of the Yorkshire Electricity Board in December, has asked the Minister of Fuel and Power to release him from that position, and the Minister has agreed to do so. The Ministry states that Mr. Pickles' request was made on purely personal grounds and had nothing to do with the working of the Board. It is believed that Mr. Pickles is to return to the chairmanship of the South West Scotland Board which he left to take up the Yorkshire Board post.

Over 300 members with their friends attended the annual dance of the **Benjamin Social and Athletic Club** (Benjamin Electric, Ltd.), which was held on 25th January at Bruce Grove Dance Hall, Tottenham, N.

Mr. W. Ll. Williams, deputy superintendent at Upper Boat power station, Pontypridd, has been appointed chief superintendent of Uskmouth power station, Newport, Mon. Mr. Williams was educated at Newport Technical College, and commenced his career as junior engineer at the East power station, Newport. Later he was with the Yorkshire Electric Power Co., and returned to South Wales ten years ago as charge engineer at Roath power station, Cardiff, where he subsequently became deputy superintendent, following which he took up a similar position at Upper Boat.

The **Worcester Electric Club** held its annual dinner and dance at the Raven Hotel, Droitwich, on 1st February. Among the guests were the Mayor and Mayoress of Worcester, the Mayor and Mayoress of Droitwich and the Town Clerk of Worcester and his wife. Over 300 attended. The toast of the Club was proposed by the Mayor of Worcester, Ald. W. H. Norton, and in his reply the president, Mr. H. G. Houldin, Associate I.E.E., thanked the committee for their work in organizing the function and welcomed two past-presidents, Messrs. C. H. Panting and H. F. Hudson. Mr. G. A. Paisley, B.Sc., A.M.I.E.E., chairman, welcomed the guests and made particular mention of Mr. G. J. Poole (British Insulated Callender's Cables, Ltd.). The Mayor of Droitwich, Councillor W. C. Taylor, also spoke.

During the recent annual dance and social of **Ashley Accessories, Ltd.,** at Ulverston, Mr. E. T. White, chairman and managing director, made presentations marking twenty-five years of service by Mr. C. A. Smith, northern representative, and Mr. J. A. Trimble, senior charge hand. Some 600 people attended the function.

Mr. F. C. Gray, A.M.I.Mech.E., has been appointed manager for Spain by the Metropolitan-Vickers Electrical Export Co., Ltd., as from 1st January. Mr. Gray went to Metropolitan-Vickers in 1938 as a college apprentice. From 1940 to 1946 he served as an engineer-officer in the Royal Navy. On completing his apprenticeship in 1947 he joined the General Engineering Department and in the following year transferred to the Export Co. In 1949 he took up an executive position with Gilbert Gilkes & Gordon, of Kendal, with whom he remained until the end of last year. Mr. Gray captained the M.-V. Rugby Football and Cricket Club in the 1947-48 season.

Mr. F. C. Gray

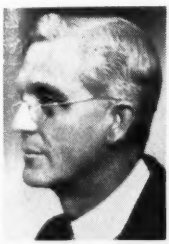
Mr. S. F. Steward, C.B.E., chairman of the **South Western Electricity Board,** recently presented awards of £10 each to two clerks employed in the Meter Records Section at Bristol, Messrs. R. W. Jenkins and F. W. G. Robertson, who are estimated to have saved the Board £200 in the past year by the invention of an ingenious calculating device. This comprises a chart with over 3,000 calculations rotating on

a[illegible]inder. The cylinder can be stopped against a[illegible]ed scale, "pin-pointing" the required fi[illegible]e very rapidly. One of the most valuable u[illegible] of the reckoner has been the calculation of p[illegible] quarter charges for hired appliances, e.g., w[illegible] there was a change of tenancy in the m[illegible]dle of a quarter. About 2,500 calculations a[illegible]ek have been made by the device, with an e[illegible]uated weekly saving of between 16 and 20 h[illegible]s—or nearly half the week's work of one c[illegible]k.

[illegible] the same meeting Mr. Steward presented l[illegible]-service certificates and gifts to a number o[illegible]mployees of the Bristol Sub-Area.

OBITUARY

Mr. **F. H. Francis**, formerly deputy manager and engineer of the Oxford Corporation Electricity Department, died on 25th January at the age of eighty. Mr. Francis was educated at Oxford Wesleyan Higher Grade School and won a two-year scholarship at the City and Guilds of London Finsbury Technical College, taking an electrical engineering course under Dr. Silvanus P. Thompson. After short periods with the Gulcher Electric Light & Power Co., the House-to-House Electricity Co., and the Sheffield Electric Light & Telegraph Co., he was appointed as assistant engineer to the Oxford electricity undertaking (at its inception) in 1890, and took an active part in the installation of the original plant. In 1901 he was appointed chief engineer to the Oxford Electric Co., which post he retained until the taking over of the undertaking by the Oxford Corporation at the end of 1931. From then until his retirement in 1936 he held the position of deputy manager and engineer.



The late Mr. F. H. Francis

Mr. W. Weygood, formerly chief engineer of the Midland Electric Corporation for Power Distribution, Ltd., died on 28th January at the age of sixty-eight. Mr. Weygood was educated at the Merchant Venturers' Technical College, Bristol, and after serving an apprenticeship in that city joined the Birmingham & Midland Tramways Co. He joined the Midland Electric Corporation for Power Distribution in 1906 and from 1936 until his retirement in 1945 he was chief engineer.

Mr. **James Magnall**, a director of the North of England Engineering & Electrical Co., Ltd., died on 22nd January. After passing through the Manchester School of Technology, Mr. Magnall joined the National Telephone Co. as an apprentice in 1903, and continued in the telephone service when it became State-owned in 1912. He was appointed assistant traffic superintendent at York in 1912, and was specially concerned with the development of the air-raid warning system. He served in a number of towns before becoming telephone manager at Sheffield in 1937. He held the position of Manpower Board chairman in Middlesbrough for four years, subsequently becoming district officer, Ministry of Labour, Middlesbrough, from which post he retired at the end of 1948. Following his retirement from the Ministry of Labour he joined the board of the North of England Engineering & Electrical Co., Ltd.

Mr. W. G. Groocock.—The death occurred at his home in Northampton on 25th January of Mr. W. G. Groocock, who retired from the managership of the Birmingham Works of the British Thomson-Houston Co., Ltd., in 1941, after having held the appointment since 1921. Mr. Groocock was born in 1870, and was actively engaged for most of his life on accurate and interchangeable manufacture, being particularly interested in methods of production and in the design and construction of jigs and tools. He was one of the pioneers of the turnover and pre-loading type of jig and an authority on limits, and over a number of years he wrote many articles for the technical Press on this and other engineering subjects. He joined the B.T.H. Co. in 1918, being appointed manager of the Birmingham Works three years later. He twice visited the United States on behalf of the company.

Mr. Frank Lonsdale, a director of the General Electric Co., Ltd., and late general manager of the company's Fraser & Chalmers Engineering Works, Erith, died on 27th January at the age of sixty-eight. Mr. Lonsdale joined Fraser & Chalmers in 1909 and, after a period in the turbine section, was appointed chief of the drawing office and subsequently manager of the turbine contracts department. In 1918, when the concern was taken over by the General Electric Co., Ltd., he became sales manager, and in 1938 was appointed general manager. Mr. Lonsdale had been a director of the General Electric Co., Ltd., since 1946.

The late Mr. F. Lonsdale

Mr. H. A. Wootton, a director of Falk, Stadelmann & Co., Ltd., and manager of the company's Birmingham accessory works, died on 4th February, aged seventy, after a short illness. Mr. Wootton was a pioneer in the

design and development of electrical accessories and was responsible for the production of the majority of the company's specialities. Before joining Falk's in 1930, Mr. Wootton manufactured electrical accessories on his own account.

Mr. W. E. Richardson.—The death occurred on 3rd February in Aberdare Hospital at the age of sixty-two of Mr. W. E. Richardson, M.I.E.E., who was for twenty years engineer and manager of the Electricity and Transport Departments of the Aberdare Urban District Council. Following an apprenticeship in his native Scotland he served with the Paisley, Chelmsford and Doncaster undertakings before becoming the " chief " at Aberdare. From vesting day until his death, Mr. Richardson held the position of commercial manager, Aberdare District of the South Wales Electricity Board.

Col. E. T. Brook.—The death occurred in January of Col. E. T. Brook, C.B.E., former superintendent of rolling stock (railways), London Transport. Col. Brook joined the service of the Underground Electric Railways in 1904 and was employed on the electrification of the District Railway and the construction of certain tube lines. In 1921 he took charge of lifts and escalators and in the following year was appointed superintendent of rolling stock (railways), a position he held until his retirement in 1945.

Mr. J. H. Macdonald, assistant resident engineer, Merz & McLellan, Poole power station, died on 27th January, aged forty-two. He was formerly with Ferguson Pailin, Ltd., the Air Ministry and the Cornwall Power C...

WILLS

Mr. R. G. Tyler, M.I.E.E., chairman of Tyler & Freeman, Ltd., who died on 14th September last, left £27,323 gross (£27,238 net).

Mr. E. M. W. Boughton, M.C., manager of the Birmingham works of the British Thomson-Houston Co., Ltd., who died on 8th September, left £15,945 gross (£15,836 net).

Mr. L. Champney, B.Sc., M.I.E.E., late of the Admiralty Research Laboratory, Teddington, Middx., who died on 28th August last, left £16,279 gross (£16,059 net).

PARLIAMENTARY NEWS

From Our Special Reporter

WHEN the House of Commons reassembled last week a statement was made by the Chancellor of the Exchequer (Mr. R. A. Butler) upon the serious economic condition of the country and some of the measures proposed to rectify it. Mr. Butler showed how the adverse balance on our overseas trade had increased and said that we must not only restore the balance but work towards the free convertibility of sterling.

There would be further reductions in imports; a charge on Health Service prescriptions; cuts in the Civil Service; economies in education; and a lower foreign travel allowance. To reduce home consumption hire-purchase regulations imposing restrictions on the period of repayment and stipulating a large minimum initial deposit would be made.

There would not be enough steel for all requirements and steps would be taken to restrict supplies for " non-essential " purposes. In the matter of building construction there must be some increase for defence purposes and for the fuel and power industries. A tight control would be imposed on the erection of shops and offices and even industrial projects which would be of eventual value to the balance of payments would have to be retarded or stopped. This was inevitable because factories needed a great deal of steel.

Endeavours would be made to reduce the home demand upon the engineering industries whose production must go to export to a large extent. Even for basic industries such as fuel and power, although they would be protected, expansion could not be indefinite.

Cars and commercial vehicles for the home market would be reduced by about a third and there would be a similar reduction in such goods as motor cycles and cycles, radio and television receivers, refrigerators, washing machines and vacuum cleaners. This would be accomplished first by discriminatory allocation of steel; secondly, if necessary in exceptional circumstances, by prohibiting supplies above a certain level; and thirdly by restricting hire-purchase.

Mr. Butler also announced that in order to round off the economic policies which had been adopted he proposed to introduce his Budget on 4th March instead of in April as was customary.

Scottish Hydro-Electric Finance

On 9th January Mr. Snadden, Under Secretary, Scottish Office, moved the second reading of the Hydro-Electric Development (Scotland) Bill.

He said that the purpose of the Bill was to increase from £100 million to £200 million the statutory limit on the amount of borrowed money which the North of Scotland Hydro-Electric Board might have outstanding at any time. The Board had already been authorized to borrow up to nearly £94 million and had borrowed nearly £56 million. Further schemes of generation and transmission had been offered by the Board for confirmation and others were in preparation. Further provision for borrowing was consequently essential.

Mr. Woodburn (Labour) said that the granting of this additional borrowing power to the Board was most profitable. The scheme was already saving over 500,000 tons of coal a year and the saving might ultimately be 4,000,000 tons a year.

Col. Gomme-Duncan (Conservative) said that thinking people in Scotland were perturbed at the great increase in actual expenditure on the schemes as compared with the estimates. On three schemes it was double.

Mr. M. Macmillan (Labour) complained that the Board had not lived up to its promise to bring electricity to the islands. It was asking for too heavy guarantees from prospective users.

Sir David Robertson (Conservative) said that there was a compulsion on the Board to foster and encourage industry in the Highland area but it had failed to do so. He challenged the Government to name one case of industry being brought in. The bulk of the energy produced was being sent to the south. Although the Board's Act stated that connections were to be made without charge farmers were being asked to meet capital charges. A farmer of 40 acres was being asked to pay £18 a year for ten years.

Mr. H. Hughes (Labour) suggested that railways in the north of Scotland should be electrified to lower transport costs and benefit Scottish trade and industry generally.

The Bill was read a second time.

Broadcasting in the North

Miss Ward asked the Assistant Postmaster General whether he had now examined the disadvantages suffered by the Northern Region in broadcasting and television, compared with other regions; and what action he was proposing to take to remedy this situation.

Mr. Gammans said that so far as sound reception was concerned, the trouble arose from the fact that North-East England and Northern Ireland shared the same wavelength and there was, unfortunately, no means of getting round this difficulty with the long and medium wavelengths available. The only solution was the introduction of v.h.f. sound broadcasting which could not take place so long as capital expenditure was severely restricted.

As for television, but for cuts in capital investment, a station at Pontop Pike to serve North-East England would have been proceeded with. He was assured by the B.B.C. that it regarded the provision of better sound broadcasting facilities and the opening of the Pontop Pike station as among the first works to be undertaken as soon as the capital investment situation was easier.

Meters Bill

The Electricity Supply (Meters) Bill was read a second time on 29th January. The Bill extends by five years the period at the expiration of which Section 3 of the Electricity Supply (Meters) Act, 1936, is to cease to apply to electricity meters.

Board Hire-Purchase Facilities

Mr. Maudling asked if the Chancellor of the Exchequer's request to the Capital Issues Committee and the banks to restrict the provision of credit for hire-purchase facilities, applied equally to the business conducted by the nationalized gas and electricity industries.

Mr. Boyd-Carpenter, Financial Secretary to the Treasury, said that there was no difference in the position in this respect of the nationalized gas and electricity industries and that of other sellers of goods on hire purchase.

Generating Plant Costs

Replying to Mr. Nabarro, Mr. Geoffrey Lloyd (Minister of Fuel and Power) said that as the cost of constructing power stations varied considerably it was not possible to be exact but a sum of £60,000/MW represented a fair average figure for January, 1952.

Lighting Mine Haulage Roads

Mr. Peter Freeman asked the Minister of Fuel and Power whether he would make regulations to ensure that the pony haulage roads in mines should be provided with electric light when electric battery lamps were not fixed to the ponies' and horses' collars, in the interests of safety and efficient working.

Mr. Lloyd replied in the negative. He said that pony haulage roads were generally in those parts of the mine where it would not be safe to install fixed electric lighting.

Electric Lamp Report

Mr. Chetwynd asked the Minister of Supply what reply he had received from the Electric Lamp Manufacturers' Association concerning the report of the Monopolies and Restrictive Practices Commission on the supply of electric lamps.

Mr. Sandys said he had received the Association's proposals and they were under consideration. He hoped to make a statement shortly.

Power Station Construction

Mr. Steward asked the Minister of Fuel and Power if he would give an assurance that the future building programme for additional power

stations was being related to the anticipated output of coal, in view of the need for increasing the export of coal.

Mr. Lloyd said that this was naturally a matter that would receive careful attention, but in emphasizing the need for increasing coal export they should be careful not to underrate the importance of an increasing supply of electric power for British industry.

Private Generating Equipment

Mr. Nabarro asked the Minister of Fuel and Power whether he would state the policy of the Government regarding factory installations of generating equipment for use independent of mains electricity consumption, and particularly including auto-diesel sets, back-pressure turbines and reciprocating engines; and whether he was satisfied that all contractual restrictions and financial inhibitions had now been removed by the British Electricity Authority in respect of independent electricity generation.

Mr. Lloyd said that these independent generators undoubtedly helped to relieve the demand on the electricity supply system and he was anxious that firms should not be prevented from installing them otherwise than by the inevitable limitation of supply. The Electricity Boards, after discussion with the Federation of British Industries, had waived contractual restrictions on the use of these plants until 1959.

Mr. Nabarro asked if the Minister realized that the Electricity Boards continued financially to inhibit the use of private generators by every possible means.

Mr. Lloyd said that if Mr. Nabarro would give him specific information about these difficulties he would investigate them.

Fuel and Power Committee

Mr. Nabarro asked the Minister what progress had been made by the Committee set up in July, 1951, to examine the wider aspects of national fuel and power policy.

Mr. Lloyd said that the Committee was meeting frequently. He had asked it to report as soon as possible, but at present he could not say when it would be able to do so.

Railway Rectifier Contract

THE General Electric Co., Ltd., has received from British Railways (Southern Region) an order covering equipment for fifty-two substations. The total value is about £2,000,000.

The apparatus being supplied, which forms part of the scheme of frequency conversion, comprises forty-eight pumpless steel-tank rectifier equipments for twenty-three substations and 33 kV, 750 MVA, e.h.v. switchgear for fifty-two substations. Each rectifier installation is rated at 2,500 kW and will supply power to the track at 660/750 V d.c. The contract includes the equipment for the Central Section of the Metropolis which embraces the densest rail traffic in the heart of London.

The G.E.C. has already supplied rectifier equipment totalling 67,500 kW for the Greater London Area, which, together with the new equipment, will constitute the largest concentration of pumpless rectifiers on any railway system in the world.

Television for Scotland

TO provide the Scottish public with a television service by the earliest possible date, the B.B.C. proposes to bring into service the low-power transmitter at Kirk o'Shotts on 11th March, on an experimental basis. Mr. James Stuart, Secretary of State for Scotland, will open the service from the B.B.C. studios in Edinburgh, and the ceremony will be broadcast from Kirk o'Shotts. Programmes during the following week will include outside broadcasts from Scotland.

The G.P.O. is installing a radio link to bring the television programmes to Scotland. This will also be on an experimental basis for the first few weeks so interruptions to the service may be necessary from time to time for adjustments to the radio link and the equipment at Kirk o'Shotts.

The Kirk o'Shotts station will carry the same programme as the existing stations at Alexandra Palace, Sutton Coldfield and Holme Moss, except that between 10 a.m. and 12 noon on weekdays during the first few weeks a still pattern (Test Card C) will be broadcast instead of the film radiated by the other stations.

It is expected that the low-power transmitter will provide satisfactory service over a considerable area of Central Scotland, including Edinburgh and Glasgow; but reception will be more liable to interference, particularly in fringe areas, than it will be when the high-power transmitter comes into service.

Christchurch Report

A POINT of interest in the 1950–51 report of the Christchurch Electricity Department is that, in spite of rising costs, electricity tariffs remained at the pre-war level. Night-time rates for water heating and bread baking, for example, are as low as ½d/kWh. Development during the year was retarded by power restrictions so that the rise in kWh sales of 3·2 per cent to a total of 237·9 million is less than the normal rate of expansion. At the end of March there were 49,839 consumers, an additional 1,277 having been connected during the year. More than half were users of electric cookers (27,971 connected) and water heaters (27,115 connected).

Engineering in Europe

Survey of Current Literature

A GRAPHITIZED copper trolley wire with a span length of 30 m between the suspension clamps showed typical wear points always near the "leading" edge of the clamp, rarely at points within the span proper (the latter were always due to small defects caused by previous bending or scratches). As the worn points made frequent replacements of the trolley wire necessary, the cause of wear was investigated by dynamometer and oscillographic measurements.

The oscillations of the system trolley arm and contact wire present a discrete sequence of natural frequencies, depending on the natural frequencies of the trolley arm, those of the contact wire (separately) and on the speed of the vehicle. Except for the rare case of coincidence of the three frequency spectra, the clamp will correspond to a discontinuity, so far as the suspension may be regarded as rigid. This results in shocks which in themselves are weak and not strictly localized when the graphite is on the wire and the latter still intact. As the graphite is gradually removed, sparking burns away the metal and then the undesirable effect is more localized and becomes a combined electro-mechanical effect (pressure discontinuity or mechanical shock and rubbing spark erosion). It is not clear yet how much the temperature rise of the wire at this weak point contributes to the wear phenomenon. — "Experimental Research into the Physical Causes of the Wear of Trolley-bus Contact Wires," Th. Vogel and A. Moles, *Rev. Gen. de l'Electricité*, Vol. 60, pp. 349–352, No. 9, September, 1951, in French.

Line Mast Tests

The availability of a closed-down section of a 110 kV transmission line afforded a good opportunity for carrying out long-planned tests to destruction on steel and ferro-concrete masts at the smallest expense and without the sacrifice of any useful material. The group tested comprised four intermediate (line) masts of ferro-concrete and one straining mast. Torsion tests were made on three of them (including the straining mast) and breaking tests on the two others, in order to test their stability. Separate tests on steel line masts were made by the firm supplying the masts for the 220 kV Kaprun-Ernsthofen line.

The value of the results, though relative because of the particular soil conditions, still permits conclusions to be drawn as to the safety and stability of the masts and their foundations (in the case of the steel masts, a framework of steel sleepers) and also enables the various analytical methods of dimensioning the foundations to be compared. The available methods of evaluation of the test results were those of Sulzberger, Ullmann and Dörr and the comparison of the results of these calculations yielded valuable data for judging the relative merits of these methods. It must not be forgotten that the problem involved is a very complex one, since it combines a sufficiently difficult problem of structural statics with one pertaining to soil mechanics.—"Breaking Tests in Situ on Masts of Ferro-Concrete and Steel and their Results," V. Petroni, *Elektrotechnik und Maschinenbau*, Vol. 68, pp. 481–493, No. 20, 15th October, 1951, in German.

Earthing Metal Masses

The daily expansion of the uses of electric power is necessarily accompanied by a correspondingly greater risk of danger to human life and health, as proved by accident statistics, making advisable more investigation of the newer aspects and forms of these dangers. With increasing transmission and distribution voltages the earthing problem becomes more complex and itself introduces new dangers, so that an increasing percentage of accidents is not due to direct contact with live conductors, but to p.d.s between earthing systems and machine frames or other metal parts in contact with floors which are imperfect insulators. The variation of the resistance of the human body with the voltage, the skin condition, etc., also plays an important part. The author is a well-known specialist

in this field and his comprehensive investigations into the physiological danger factors, potential distribution and gradients around single masses and groups of metal masses at a danger point, advantages and risks of neutral earthing, resistances of various soils and of artificial floorings were applied to the concrete case of a certain mechanical workshop, the danger field of which was exactly determined and mapped out. A simpler example is concerned with connections to the floor and earthing in a small substation.

The most important aims must always be to obtain equipotentiality of all elements which can be touched simultaneously and to equalize floor potential and actual earth potential.—" Earthing and Earth Connections of Metallic Masses: Protection of Personnel against Dangers arising from Contact with a Metal Mass accidentally under Voltage," G. Bodier, *Bulletin, Société Française des Electriciens*, 7th Series, Vol. 1, pp. 683–710, No. 11, November, 1951, in French.

Distribution System Harmonics

The harmonic content of the output of any modern generator is usually negligible, though always present, but among the consuming devices in the systems supplied there are always a considerable number of types of apparatus that cause distortions, and therefore harmonics. The latter may then be amplified in the system by resonance phenomena. The actual harmonic content of the voltage and currents in a system is interesting in many cases (the phase relations of the individual harmonics less often) for calculating the losses by current heat, the temperature rise in damper windings of synchronous machines, dielectric losses in capacitors, and in the investigation of resonance phenomena.

The new frequency analyser described in the article is a compact instrument comprising variable-frequency generator, mixer, selective amplifier and recording instrument (and the power pack for mains supply) and operates by a compensation method. It works in a frequency range up to 2,000 c/s and may therefore also be used for measurements of harmonic content in cases like telecontrol systems working with acoustic frequencies, etc. Its main purpose, however, is to measure and record automatically and continuously the voltage harmonics at a given point of a system and the variations of the harmonic content owing to load variations. Characteristic frequency spectra obtained with the instrument are presented.—" Measurement of Voltage and Current Harmonics in a Distribution System," P. Gaussens, *Rev. Gen. de l'Electricité*, Vol. 60, pp. 371–376, No. 9, September, 1951, in French.

Transformer Behaviour

This second portion of a two-part paper deals more particularly with testing methods, beginning with repeated impulse tests at reduced voltages, without going into the details of the set-up, but giving and discussing examples of oscillograms obtained in such tests and deriving from them the voltage distribution over the various parts of the windings. The following section is devoted to the various test standards in force in the principal countries, from which it is seen that in France these matters are still in the development stage.

The principles and set-ups for tests at v.h.v. are discussed next, it being interesting to note that the basic principle of the Marx circuit, now generally used for h.v. impulse generators, was already used by G. Planté as long ago as 1879. The theory of the regulation of the waveform is outlined and the precautions and corrections necessary for ensuring stability of the operation of the impulse generator are indicated. More details about the actual construction of the generators and about the measuring equipment follow.

The closing paragraphs of the paper are devoted to fault detection methods by current waves (neutral current method).—" The Surge Behaviour of Transformers, Part II," S. Kohn, *Electricité*, Vol. 35, pp. 226–232, No. 175, September, 1951, in French.

[Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at the current rates.—Editors, *Electrical Review*.]

Voltage Standardization

A LONG-TERM plan to obtain uniformity in electricity supply throughout the Midlands has entered upon another phase. The Midlands Electricity Board announces that it proposes to standardize the voltage of the a.c. supply in the area formerly served under the Halesowen Electricity Order, the North East Worcestershire Electricity Order and the West Midlands Electricity Order.

Buried Cables

The Legal Aspect

By F. E. SUGDEN, A.C.I.S.

A VERY interesting case occupied the attention of the courts recently, in which a mechanical excavator was employed to dig a trench across a piece of land where an electrical cable had been laid some years earlier, the existence of which appeared to be unknown, both to the owner of the land and the firm digging the trench. An accident occurred and the question arose who was liable for the injury to the workman concerned.

Briefly the facts were these. The first defendant had obtained a contract from the County Council to erect workshops on land belonging to the Council and he sub-contracted with the second defendants to excavate a trench across the land for drainage purposes. Without the knowledge of the County Council the predecessors of the plaintiffs (a colliery company) had placed the cable under the land, which unfortunately ran across the line of the proposed trench, for the purpose of supplying electricity to a colliery belonging to the plaintiffs.

Not Marked on Plan

The first defendant in the case had been supplied by the County Council with a plan of the land showing the line of the required trench, but the underground cable was not marked on it. During the course of the work the mechanical excavator, driven by a workman employed by the second defendants, broke the concrete cover of the cable and damaged the cable itself, but it was thought at the time that no serious harm was done. The clerk of works of the County Council was informed of the accident, but the County Council did not inform the plaintiffs. As a result of the accident water seeped through the insulation of the cable and an explosion occurred and cut off the supply. The colliery proprietors brought an action against the first and second defendants alleging trespass and negligence. On the facts it was found that the defendants were not guilty of negligence.

The Court held that the plaintiffs were at fault in the matter, the accident being attributable mainly to the conduct of their predecessors in placing the cable on the County Council's land without its knowledge. As the defendants were entirely free from fault, having merely done what they were required by the County Council to do, there was no trespass by them and therefore neither the County Council nor the proprietors of the mechanical excavator were liable for the explosion.

Contractors' Position

Contractors are often called upon to lay a cable across a piece of land between, say, two factories, but if they do it without first obtaining the permission of the owner of the land it is possible that there may be complications.

Suppose for some unknown reason the owner of the land decides to excavate it for some purpose and in so doing damages the insulation of the unknown electric cable, then in that case it would be serious for the electrical contractor if any person were injured because the owner of the land had no knowledge of the existence of the cable.

If cables are to be laid or any connections made between one factory and another, between which a roadway passes, it is most imperative that the electrical contractor should be in a position to show that he has taken all reasonable steps possible in order to ascertain the position and condition of any mains. This should be verified, if possible, by correspondence to show that the contractor has taken all reasonable steps to prevent any accident occurring to his own workmen or to any workmen employed by other contractors on the same job.

Therefore I strongly advise that any contract, particularly if it is with a local authority, should contain a clause ensuring that if any hidden defects are found either on or in the land the electrical contractor will not be responsible for the results.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Miniature Earphone

A MINIATURE earphone and associated accessories for use with office dictating machines and similar apparatus is now available from AMPLIVOX, LTD., 2, Bentinck Street, London, W.1. Known as the type E.5 earphone, it is available with d.c. resistances from 2–2,000 ohms with a frequency range of 100–4,000 c/s. It weighs only one-third oz and has a diameter of 0·835in and a depth of 0·420in.

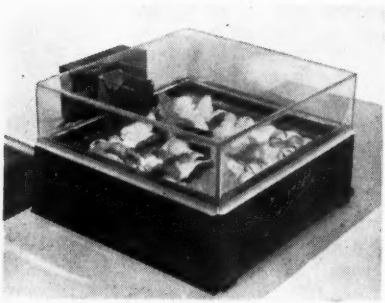
Mine Shaft Signalling Supply

Two new types of "Neverfayle" self-contained steel-clad battery units for use with mine shaft signalling equipment have just been developed by NIFE BATTERIES, Redditch, Worcs. Based on the proved design of the company's well-known tripping units the equipment offers a reliable source of d.c. for shaft signalling under both normal and emergency conditions. Units operating on either a single or dual battery system can be supplied.

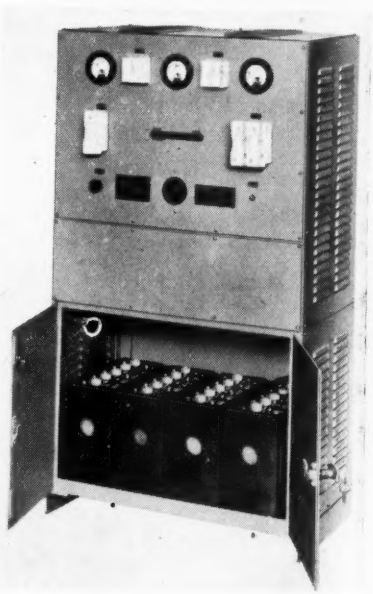
Observation Incubator

The hatching of chicks can be observed in an incubator which CURFEW APPLIANCES, LTD., Ottershaw, Chertsey, Surrey, have brought out with the whole of the top portion constructed of "Perspex." The 200 W grid type electric heater, which operates at black heat, is situated in a vertical channel around all four sides between the outer wall and the egg tray. The temperature is controlled by a mercury trip thermostat. Besides being suitable for the small poultry keeper the incubator should also be useful for schools, laboratories and agricultural colleges. The 60-egg size is priced at £14 15s.

Curfew observation incubator



Above: **"Amplivox" E.5 earphone and associated accessories.** *Below:* **Nife "Neverfayle" mine shaft signalling battery unit**



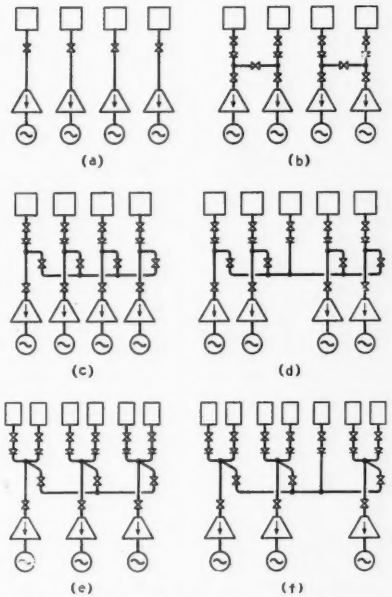
Generating Plant Sizes

Grouping to Suit Grid Operation

CONSIDERATIONS affecting the capacities and groupings of boilers and turbines serving the British grid formed the subject of a paper presented by Messrs. Bryan Donkin and P. H. Margen (Kennedy & Donkin) last week at a meeting of the Supply Section of the Institution of Electrical Engineers. The criteria chosen were security of supply and sound economics. The authors pointed out that, while capital and working costs per kW decreased with size of units, the amount of reserve plant and the strength of electrical interconnection required for security tended to increase. The size of unit ensuring minimum total costs was related to the total load at any point and to the distance between stations.

After discussing the relation between cost and unit sizes of boilers and of turbines and the capacities of stations and the influence on design of shift operation, the authors assessed the bearing of these factors on the reserve necessary to keep within a desired margin of short-term risks, such as cold weather spells or plant failures. Long-term chances, e.g., errors in forecasting load development or plant commissioning dates could normally be offset by deferring the retirement of old plant. A solution for a system with load centres at uniform spacings was described, a " basic system " being first assumed in which each load centre had its own generating station, electrical connectors being for emergency use only.

This basic system would be modified by the gradual retirement of older stations, which would be accompanied by the need to obtain sites often remote from load centres and having abundant cooling water and lower costs of fuel and transport and hence longer transmission distances. There would also be heavier power interchanges between areas served by base-load stations and by peak-load stations. In some areas a new station would supply several small, instead of one large, load centre through a 132 kV network. The overall result would probably be some spare transmission capacity to counteract increased transmission cost.



Schematic diagram of plant groupings for 400 MW station containing 100 or 133 MW sets
(a) Simple unit grouping. (b) Coupled unit grouping. (c) Steam tie-bar unit grouping. (d) Unit group plus one spare boiler per station. (e) Two boilers per turbine. (f) Two boilers per turbine grouping plus one spare boiler per station

The comparative overall costs of six plant groupings were then considered. In three of these, each boiler was associated with a single 100 MW turbine (*a*) as a single isolated unit, (*b*) with an emergency connection between every pair of boilers, and (*c*) with a common steam main or " tie bar " to which any boiler or turbine could be connected if required. A fourth grouping (*d*) was similar to (*c*) except that an additional boiler per station as stand-by of full rating could feed the tie bar. A fifth

combination (*e*) differed from (*c*) in that two boilers of half rating supplied each turbine. A further alternative (*f*) was similar to (*d*) in having two half-rated boilers per turbine and one similar boiler as station stand-by. Total charges per MW of winter demand per annum were calculated as (*a*) £4,401, (*b*) £4,419, (*c*) £4,424, (*d*) £4,693, (*e*) £4,444, (*f*) £4,626.

The effect of plant grouping on station availability was dealt with under three headings: non-urgent periodic complete overhauls, general maintenance permitting of short delays, and " forced outages " permitting of no delays. Future overhaul periods were taken as four weeks each year for boilers and six weeks every alternate year for turbo-alternators. Reductions in annual costs of inavailability per MW of winter demand per annum achieved by coupling pipes would be £45·3, by complete steam tie bar £54·2, and by stand-by boiler of full rating £140·9 and of half rating £134·6.

The conclusions reached were that: for the next few years grid conditions would not generally call for unit ratings of less than 100 MW; one boiler per turbo-alternator of equal capacity with a simple steam tie bar would usually provide the most favourable combination, but where the reheat cycle was adopted there would be no cross connections on the ground of expense. On sites of restricted capacity two units might economically be installed, but single-unit stations should be avoided, except possibly at pitheads.

DISCUSSION

Mr. J. D. Peattie (B.E.A.), who opened the discussion, said that the value of the paper lay not so much in the detailed calculations as in the line of thought which it suggested to those who had to make decisions, since decisions had to be made not merely on the results of calculations but in the light of judgment, and based on past experience and factors for which no precise details were available.

The distinction between normal and emergency conditions was implicit in the authors' arguments, but, having lived through two world wars, two rearmament periods and a succession of peacetime crises, he wondered what he was to understand by " normal conditions." This was a serious matter when plans had to be made. Availability played a major part in the decision to install very large unit-type plant and, until more precise data were available about the physical features which lay behind availability, particularly in the case of boilers, it was difficult to make accurate economic calculations.

The British Electricity Authority now had a wide choice of sites for stations, but almost no choice of fuel. Sites near coalfields were therefore very attractive for the installation of large, highly-efficient unit-type plants.

Two-Shift Operation

Mr. H. V. Pugh (London Division, B.E.A.) welcomed the recommendation that even plant of the size which the authors proposed should be designed to operate on a two-shift basis. They had experience to-day of plant which had been in service for perhaps sixteen years and was now having to operate on a two-shift basis, and they were getting all sorts of troubles which never occurred when the plant was on base load. It would be necessary to sacrifice some of the efficiency of new plant in order to ensure that it could run satisfactorily under two-shift conditions. He thought that the general opinion in the industry to-day would be against taking turbo-alternators out for overhaul every second year. Large turbo-alternators could be given a thorough overhaul every third year, carrying out the work in four to six weeks.

Mr. W. F. Simonson (Water-Tube Boiler Makers' Association) said that past experience of pulverized-fuel firing in boilers of progressively increasing unit capacity gave good ground for confidence that the availability of a boiler of 830,000 lb/hr would match its 100 MW turbine counterpart, but he hesitated to accept the suggestion that such units should at some stage in their service life be relegated to shift duty. Experience had been gained in the United States with the quick starting of large turbo-alternator sets, but not with a steam stop-valve temperature as high as 1,050 deg F.

Variations in fuel quality might seriously modify some of the authors' conclusions and limit, at any rate in the immediate future, the practical applicability of the 100 MW unit in this country. It would also prevent the acceptance as a general conclusion that stand-by boiler capacity

could be dispensed with. When generating plant in the older stations fell due for replacement, if the new plant was designed for peak-load operation, omitting all unessential refinements, the cost differential in comparison with large-unit stations might disappear. A contributing factor would be a measure of standardization of boilers, turbines and the principal station auxiliaries. In that case a continuation of present B.E.A. policy would be economically justifiable.

Need to Plan Ahead

Mr. C. E. H. Verity (B.E.A.) said that plant extension programmes had nowadays to cover a period of three years, namely, the fifth, sixth and seventh years ahead. While experience showed that the factors involved had to be dealt with individually in respect of each programme, the trend was in the direction of the use of larger individual plant capacities and the increasing adoption of the unit system. Under present conditions, however, it took about five years from the settlement of particulars to the commissioning of the station, and this was one of the most important factors to be considered in connection with both the sizes and the grouping of plant.

Dr. R. J. Eldred (Merz & McLellan) emphasized that complete "unitization" would involve very considerable duplication, perhaps triplication, of important auxiliaries to maintain availability, but the amount of stand-by auxiliary plant could be reduced by interconnection. With regard to the effect of eventual shift operation on plant design, since at least half the available capacity was required for shift working it would be reasonable to consider the economics of such plant on the basis of the corresponding load factor. This would tend to result in two distinct types: a very high efficiency plant for base-load operation and a less efficient, but cheaper and more manœuvrable plant, for shift working.

Pro. R. O. Kapp (Kennedy & Donkin) observed that statistical formulæ provided the only reliable basis for a decision when the individual occurrences were both very variable and each singly unpredictable. Examples of this were the ages at which people died and the occasions when turbo-alternators developed defects. In dealing with the former, insurance companies used statistics, but in power-station design in the past "hunches" had been acted upon, so that on Tuesday it would be decided that two spare sets would be adequate and on Wednesday, after a bad night, that nothing fewer than three would do.

Insurance companies would be bankrupted by such methods, but in electricity supply they merely meant a reduction in reliability and some increase in cost, so that one was not so obviously found out. The sensible thing to do was to put as many considerations as possible into a formula, so that one's mind was left free to deal with the others, which must be matters of judgment. For instance, the authors' conclusion that the best size of unit was substantially greater than those installed at present was sound, but that did not mean that in the next power station to be built the size of turbo-generator should be doubled, because consideration must be given to the fact that 30 and 60 MW sets had been standardized and could be built more quickly. It meant that an immediate start should be made on developing and standardizing larger sets.

Mr. A. W. Pedder (Merz & McLellan), while agreeing, for different reasons, that 100 MW sets were right, did not feel that anything had been proved by the authors' method of approach, which he subjected to some detailed criticism.

Mr. I. D. Campbell (National Coal Board) described it as an "old English custom" first to decide on what one was going to do and then to find a statistical reason for doing it. He suggested that where there were collieries which could supply a small quantity of a certain fuel continuously there was a case for the small station.

Mr. J. A. B. King suggested that on shift operation there was no need to shut down the plant overnight; troubles in the turbine might be avoided by leaving it ticking over at a very low speed with steam trickling through.

Dr. F. Rogers and Mr. C. F. Flurscheim also took part in the discussion, to which Mr. P. H. Margen replied.

E.I.B.A. Branch Ball

THE Berks, Bucks and Oxon Branch of the Electrical Industries Benevolent Association is holding its third annual ball on 14th March at the Olympia Ballroom, Reading. Tickets (7s 6d single, 12s 6d double) can be obtained from Mr. L. H. Waters, Southern Electricity Board Offices, Market Place, Reading.

C.I.G.R.E. Programme

Meeting in Paris Next May

THE preliminary programme of the biennial Conférence Internationale des Grands Réseaux Electriques which, as reported in our issue of 25th January, will be held this year in Paris from 28th May to 7th June, a week earlier than usual, provides for the discussion of 117 papers which in C.I.G.R.E. Bulletin No. 1 are divided into four sections instead of three as before. The first deals with alternators and other rotary machines, rectifiers and capacitors, high-voltage circuit breakers, insulating material and measurements. The second section covers construction and maintenance of cables and overhead lines and ancillary equipment. A third section is concerned with the operation, protection and interconnection of networks and a fourth deals with power transmission above 220 kV.

Subjects of papers to be presented by British delegates are:—Design features of the British 275 kV transmission system, by F. J. Lane and A. J. Gibbons; operation of synchronous plant, by W. D. Horsley; on-load tap changers, by L. C. Richards and H. Diggle; surge voltage distribution in open-circuit sections of transformer windings due to voltage regulating tappings, by E. L. White; report of the Transformer Study Committee, by E. T. Norris; effect of linear resistors on current interruption, by J. R. Mortlock and K. M. Jones; restriking voltages and amplitude factors, by J. S. Cliff; network analysis of inherent restriking voltage transients of the 132 kV grid, by J. S. Cliff; the compression cable, by C. T. W. Sutton; 33 kV submarine cables to the Isle of Wight, by L. J. W. Bartholomew; toughened glass insulators, by E. F. Johnston; maintenance of the 132 kV grid, by H. R. Schofield; pilot relaying for transmission systems, by S. C. Leyland and J. L. Blackburn; power supplies for light current auxiliary equipment, by G. W. B. Mitchell; digital computers, by J. M. Bennett, F. V. Dakin and U. G. Knight; alternator stability on low excitation, by E. Friedlander; power loss and radio noise measurements on a 275 kV experimental line, by Dr. J. S. Forrest; basis for e.h.v. development in Great Britain, by D. P. Sayers and P. W. Cash.

To ensure continuity of work between biennial meetings seventeen international study committees have been formed. One of their duties is to prepare discussions for the Conference meetings, over which the chairman of the appropriate study committee presides. Mr. C. W. Marshall is chairman of the committee responsible for telephone and radio interference and Mr. E. T. Norris of that responsible for transformers. Mr. P. V. Hunter is chairman, Sir Vincent de Ferranti vice-chairman and Mr. R. A. MacMahon secretary of the British National Committee.

C.I.G.R.E. has a permanent membership of 1,650 from 35 countries. Monsieur E. Mercier (France) is honorary president and Dr. R. G. Schmidt (Switzerland) is president. Mr. A. Nimmo (Great Britain) is a vice-president.

Dow Prize Competition

IN memory of John Stewart Dow and by virtue of a bequest by him, the Illuminating Engineering Society is offering a prize which will be awarded to the winners of a competition intended to encourage collaboration between students of illuminating engineering or those branches of engineering concerned with illumination, and students in other fields in which applied lighting plays an important part.

While entries from individuals are not excluded, the competition is primarily intended for students working in collaboration. The winning entry will receive a total cash award of £75 and a certificate will be presented to each member of the winning team. Certificates of commendation will be awarded to any other entries of outstanding merit. The competition will be set and judged by a panel of assessors appointed by the Illuminating Engineering Society, in co-operation with the Royal Institute of British Architects and the Institution of Electrical Engineers.

The subject for the 1952 competition is the layout, artificial lighting and decoration of a ground floor showroom. The competition is open to anyone who has not completed his 26th year by 1st April, and who has had training of a nature appropriate to the subject of the competition. All members of a team must comply with these conditions. Documents with instructions as to the form which entries should take will be available on 1st April. Forms of application may now be obtained from the Secretary of the I.E.S., 32, Victoria Street, London, S.W.1. The last date for submission of entries is 30th November next.

MANUFACTURING PROGRESS—1951

The General Electric Co., Ltd.

NO doubt the most important production development of the G.E.C. last year was the opening of the new heavy engineering works at Witton (*Electrical Review*, 16th November), substantially increasing the company's output of turbo-alternators and allied plant.

Orders received from the B.E.A. for 75,000 kVA hydrogen cooled turbo-alternators bring the number of such sets now in hand up to twelve. Other home orders include a fifth 37,500 kVA set for Woolwich and two of the same rating for Huncoat power station. Orders for turbo-alternators have also been received from the Vryheid Colliery and Bloemfontein, South Africa; from Demerara, British Guiana; and from Mackay City Council, Australia. Generating plant delivered overseas included two 47,500 kVA turbo-alternator sets for the Orlando power station, Johannesburg, for which five further 37,500 kVA sets are in hand, while plant commissioned overseas includes turbo-alternator sets for the Wide Bay electricity undertaking, Queensland; the Athens Electric Co.; the United Africa Co.; and West Bokaro, Ltd., Calcutta.

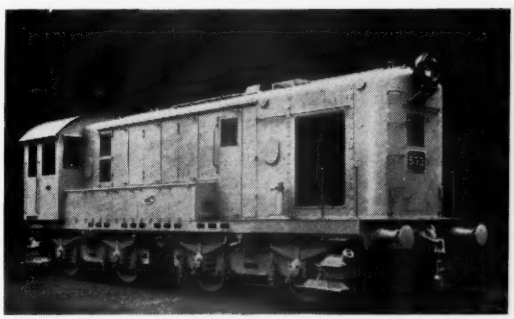
Some large transformer and reactor developments are outstanding. For the Huddersfield power station two 45,000 kVA and two 37,500 kVA transformers were ordered, while two 20,000 kVA transformers and seven outdoor reactors were under construction for the Whitehead Iron & Steel Co., Ltd. Two 45,000 kVA transformers were built for Cheltenham, and the second of the six 70,000 kVA generator transformers for the new Uskmouth power station was delivered. Export orders placed in this field included 25 outdoor transformers, totalling 160,000 kVA, for the Government of India.

Typical of some heavy switchgear developments is the order for twelve 132 kV outdoor oil circuit breakers, each with a breaking capacity of 2,500 MVA, for Meaford "B" generating station. Outdoor switchgear for six complete substations was ordered for the Hirakud Dam project, India, and much outdoor switchgear is being produced for the State Electricity Commission of Victoria. Many medium duty metalclad switchboards are in hand, and a 37-panel 6·6 kV board was installed for the tramway section of the City of Glasgow transport undertaking.

In the rectifier field a new single-anode, grid controlled, air-cooled pumpless mercury arc rectifier embodying the side arm principle was developed. It is especially suitable for three-phase full-wave rectification which gives a smoothness of output equivalent to that of six-phase rectification. High speed electronically applied arc suppression is incorporated in 1,200 kW 1,500 V six-phase rectifiers commissioned on the Netherlands Railways.

Developments in material handling in the mining industries appear to be exceptional. The North Eastern Division of the N.C.B. placed orders for the conversion to electric driving of a steam winder at Chanters Colliery, Manchester. Of the considerable amount of mining equipment for the Dominions, eight motor generator sets were ordered for G. A. Brown & Abermain Seaham Collieries, Ltd., New South Wales, while for the Rand Mines, South Africa, a geared double drum

One of the diesel-electric locomotives for Ceylon



winder was in the course of erection. A copper-nickel convertor delivered to the Rustenburg Platinum Mines, Ltd., South Africa, forms part of a complete plant for smelting copper-nickel concentrates.

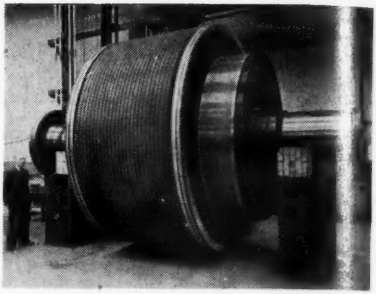
The company is making an important contribution to the national steel production programme. A comprehensive contract was concluded with the Whitehead Iron & Steel Co., Ltd., for the electrical equipment for a cold strip mill. A 40in cogging mill at the Redbourn Works of Richard Thomas & Baldwins was converted from steam to electric driving, employing a 5,000 h.p. d.c. motor (12,500 h.p. peak) under Ward-Leonard control, with cascade exciters. The 45in slabbing mill and the continuous hot strip mill at the Abbey section of the new works of the Steel Company of Wales, Ltd., were commissioned. A single stand cold rolling steel strip mill supplied by W. H. Robertson, Ltd., to Devillez et Camion is in commission at Paliseul, Belgium, and the G.E.C. provided the main and auxiliary mill motors, the motor generator set, and the a.c. and d.c. control gear.

The extent of electrical applications in the oil industry is roughly indicated by the order for 179 s.c. motors, totalling 11,500 h.p., from the Shell Petroleum Co., Ltd.

The potentialities of textile electrification have been increased by the extension of the range of loom motors to include machines developing ¾, 1, 1¼ and 1½ h.p. at 720 r.p.m. An order is in hand for the complete electrification of the Khaipur State Textile Mills, Pakistan.

Railway electrification helped the export drive. Eight diesel-electric locomotives were completed for the Ceylon Government Railways, and most of them are already in service. Forty 3,000 V, 3,000 h.p. main line locomotives for the South African Railways are being erected.

Among marine orders was one from the Director of Navy Contracts for eight 155 kW 220 V turbine driven totally enclosed water cooled generators. A contract for the electrical equipment for the Karachi graving dock has been concluded with Gwynnes Pumps, Ltd.; work is in hand for geared turbo-alternators for tankers for the Gulf Oil Corporation and for a number of 350 kW d.c. sets for tankers of other ownership. The popularity of the G.E.C.'s plural starting equipment has resulted in many orders for its use on board ships, including the *Ocean Monarch*.



Armature of 5,000 h.p. motor driving Richard Thomas & Baldwins' cogging mill

Industrial heating developments included a new type of continuous decarburizing furnace which occupies the minimum of floor space and affords very high processing speeds. A recent installation for continuous decarburization of silicon steel strip is loaded electrically at 620 kW. It has an operating temperature of 950 deg C and handles about a ton of strip an hour. Another novel continuous furnace for the carbo-nitriding of engine gear-box parts is being developed for a leading car manufacturer in Paris. A new roller hearth furnace 120ft long and complete with atmosphere plant was installed for the bright normalizing of steel strip in suitable lengths. The output is 10 cwt an hour.

In agriculture, the heat storage block type of dairy sterilizing equipment was followed by a larger unit which provides steam and hot water simultaneously for sterilizing and washing milking plant and machines. The water heater loading is two or three kW, while the loading of the storage block is 2 kW. Without the storage principle the direct maximum loading for the same service would be 20 kW.

Complete electrical equipment for the New Port grain elevator in Buenos Aires, with a total capacity of 150,000 tons, is believed to be the largest equipment of its kind in the Southern Hemisphere.

An important development in the electronic control field is high speed electronic arc suppression units on the grid-controlled mercury arc rectifiers supplied to the Netherlands Railways. There are, in all, 16 such units, and they incorporate the company's triple frequency method of tripping. Electronic control is used for the flying shear on the continuous hot strip

mill and on the temper mill at the new works of the Steel Company of Wales, Ltd.

An important development in the lighting works is the improvement in the life of fluorescent lamps, which is achieved by better methods of retaining emissive material within the cathode coils. The luminous efficiency of the 1,000 W mercury lamp for high bay lighting was increased from 45 to 48 lumens/W. A new portable emergency battery lighting set comprises a 6 V battery, a trickle charger and a powerful floodlight contained in a metal case with a carrying handle. It is arranged to switch on and off automatically with the failure and resumption of an a.c. supply.

Developments in cable manufacture include two types of cable insulated with special quality asbestos paper and sheathed respectively with welded aluminium and welded stainless steel. They are non-inflammable, non-ageing and fire resistant, and they maintain their electrical properties at high temperatures.

Load bias busbar protective equipment which is being supplied to Staythorpe and other power stations embodies the latest development of the biasing principle. A relay which was developed for circuit breaker intertripping schemes discriminates between the d.c. intertripping signal and any a.c. flowing in the pilot circuits.

The control of alternators by means of static voltage regulating equipment has been advanced by the completion of six units for the Ministry of Supply, which regulate both exciter and alternator voltage.

Transformer developments of a basic nature include a 132 kV fully impulse tested voltage transformer, and the use of reactors to enable single-anode mercury arc rectifiers to operate directly on three-phase supplies without intermediate transformers.

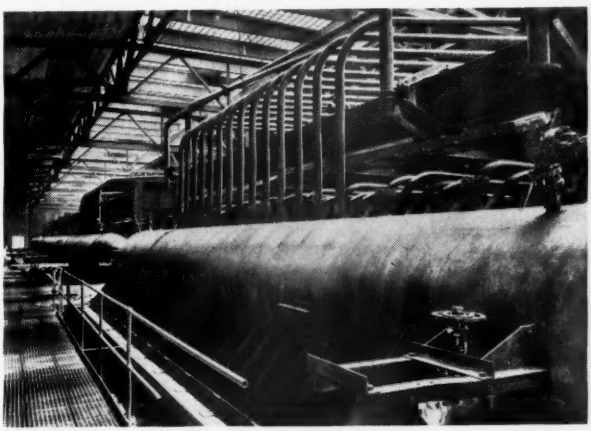
A gate end box which conforms to the N.C.B. specification and is in the course of development is for the direct-on-line starting of coal cutter and conveyor motors at the coal face. The design provides for alignment of the units in switchboard form.

In a deep-penetration magnet for handling scrap in restricted places maximum lifting capacity with minimum magnet diameter is secured by increasing the overall depth to diameter ratio.

Babcock & Wilcox, Ltd.

FOLLOWING the recent announcement by Lord Citrine, chairman, British Electricity Authority, that the installed generating plant capacity on public supply in the Authority's area was increased in 1951 by 1,113 MW (*Electrical Review*, 11th January), it is not difficult to believe that a very large proportion of this company's activities during the year related to plant for the B.E.A.

In actual fact the boilers commissioned for the B.E.A. during the year represented a total steaming capacity of 7,000,000 lb/hr. They included two 360,000 lb/hr units for North Tees; two of 300,000 lb/hr for Braehead; two of 365,000 lb/hr for Cliff Quay; four of 300,000 lb/hr for Bromborough; two of 360,000 lb/hr for Blackwall Point; two of 350,000 lb/hr for Rye House; and two of 300,000 lb/hr for Wigan.



Boilers commissioned for the B.E.A. included 300,000 lb hr units for Wigan; drums during erection

Orders were received from and installations commissioned in Latin America for a large number of units of moderate size, including four 240,000 lb/hr boilers for the Puerto Nuevo power station of the Cia Italo Argentina de Electricidad; and two bagasse-burning boilers under erection at Sao Joao, Brazil.

Outstanding developments in the Dominions included the steaming of a 180,000 lb/hr " Bidrum " boiler at Osborne " B " power station, Australia, and six 580,000 lb/hr p.f. fired " Radiant " boilers for Taaibos power station, South Africa.

Continental business includes orders taken in Holland in collaboration with K.M. Gebr. Stork & Co., of Hengelo for boilers using low volatile coal as pulverized fuel, and an order for a boiler for Helsingfors power station, to be fired with both coal and oil, having a capacity of 240,000 lb/hr when both fuels are used fully and simultaneously.

On the coal and ash handling side plants were installed or being installed at several of the new British power stations. These include " Hydrojet " and " Hydrovac " system plants, and jib cranes for grabbing water-borne coal from comparatively small barges at the Wigan power station.

Ice Cream Exhibition

VIRTUALLY all the ice cream sold to-day is produced with the aid of electricity. This was well exemplified at the First National Ice Cream Exhibition at Manchester last week.

Ormerod Engineers, Ltd., showed typical examples of homogenizers of from 10 to 300 gall/hr capacity and made a special feature of two self-contained heat treatment plants (10 and 25 gall), both incorporating condensing units, coolers, pasteurizers (with 12½ kW heating elements) and homogenizers. The larger one is equipped with recording and central control panel, contactors giving full overload protection for the motors of the mixer (½ h.p.), homogenizer (½ h.p.) and condensing units (1 h.p.).

Pasteurizing plant of from 10 to 50 litre capacity was also exhibited by Frigmatic, Ltd., and Henwood Productions, Ltd., showed the " Kay " combined pasteurizer and cooler designed to produce up to 10 gall of ice cream.

On the Frigidaire stand there were hardening cabinets, ice cream conservators, " lollipop " freezer and storage cabinets, ice cream mix coolers, " reach-in " refrigerators, service cabinets, soda fountain and ice cream bars, frozen food storage cabinets, and high powered condensing units, as well as " Walden " chocolate enrobers, brickette cutters and wrappers.

In addition to demonstrating a representative range of ice cream freezers, a freezer with an output of 1,000 2 oz " lollipops " an hour, self-contained soda fountains and " Sternette " ice cream conservators and freon condensing units, the Lancashire Refrigeration Co., Ltd., co-operated with Siddalls Ice Cream Co., Ltd., in the display of the new " Sternette Hill " frozen food dispensing cabinet and in the installation of ice-cream processing equipment.

York Refrigeration's " Lolli-freezer " has been specially developed for operation with an existing tub-type freezer: comprising simply a brine tank and a thermostatically controlled pump it produces 1,000 " lollipops " an hour.

Attention was also drawn to the " Economiser " condenser, designed to save about 95 per cent of the water normally wasted in a water-cooled refrigeration plant. Conservators, a hardening room and an easily suspended cooler were other items seen on the stand, while outside the hall were examples of refrigerated vehicles in which York equipment is used.

The new " OFC351 " frozen food cabinet and ice cream storage conservator, with a capacity of 350 lb of frozen food and 48 gall of packaged ice cream, was prominent on the " Prestcold " stand.

New items among the " Coldrator " display by the International Refrigerator Co., Ltd., were a frozen food display cabinet and a " lollipop " freezer ; other products shown were a 7·1 cu ft domestic refrigerator and three ice cream conservators.

Kelvinator " Polarsphere " sealed units now being made in this country are incorporated in the new range of conservators and storage cabinets shown by F. W. Fidler & Son, Ltd., who also displayed a new bottle cooler, a 7 cu ft domestic refrigerator, service cabinets with deep freeze lockers, and dual temperature counters. A range of " Defiance " emulsifiers, pasteurizers, coolers, brick cutting and chocolate coating machines, etc., was shown by Nathan's Sales, Ltd., and a new extruding table was introduced by the S.B. Engineering Co., Ltd. Over 2,000 brickettes an hour are cut, dipped and wrapped on a machine demonstrated by Gainsborough Craftsmen, Ltd.

A machine which dispenses ice cream brickettes in three different thicknesses was the outstanding exhibit of the Lightfoot display which also included a " lollipop " freezer, a hardening cabinet, conservator and compressors. Refrigerated service counters are a speciality of the R.D. & M. Engineering Co. Wafers were produced on a Baker Perkins machine on the International Biscuit Co.'s stand.

Commerce and Industry

Hire-Purchase Restrictions

Danish Radio Contract

In the House of Commons statement last week the Chancellor of the Exchequer announced that one way in which he proposed to limit public expenditure was by restrictions on hire-purchase business. To bring this about the Board of Trade has made the Hire-Purchase and Credit Sale Agreement (Control) Order, 1952 (S.I. No. 121, H.M. Stationery Office, 3d).

This provides that all hire-purchase and credit sale agreements made after 31st January shall conform to certain requirements; it does not affect agreements made before that date. The requirements are that in respect of the scheduled goods (with the exception of bicycles and tricycles) a minimum deposit of 33⅓ per cent of the cash price must be made and that the balance must be paid within a maximum period of eighteen months.

Among the goods covered by the Order are the following:—

Radio receiving sets and television receiving sets (including portable sets and sets designed for use in road vehicles), whether or not assembled and whether or not complete; television aerials and cathode ray tubes.

Gramophones, radio-gramophones, record players and recording machines.

Appliances and apparatus, whether mechanically operated or not, being appliances or apparatus of a kind designed or suitable for domestic use, the following:—

Space heating and water heating appliances, excluding appliances (whether or not with provision for gas ignition or electrically operated combustion controls) designed to burn solid fuel only; dish washers; drying cabinets; washing machines and washers, excluding wash boilers and wash coppers; ironing machines and irons; wringers and mangles; floor polishers; vacuum cleaners; water softeners; refrigerators having a storage capacity not exceeding 12 cu ft; machines for mixing, extracting and preparation of food and drink; and sewing machines.

Hair dressing and hair waving machines.

Mechanically propelled road vehicles and chassis (excluding ambulances, invalid carriages, bicycles, tricycles, and vehicles specially constructed or adapted for disabled people).

The Board of Trade has also issued an Order making certain consequential amendments to the existing Order controlling service charges on price-controlled goods (Hire-Purchase and Credit Sale Agreements (Maximum Prices and Charges) (Amendment No. 2) Order, 1952, H.M. Stationery Office, 2d).

Non-Ferrous Metal Pricing

The Ministry of Materials announces that, in order to facilitate the pricing of export orders by manufacturers, the following supplementary method of pricing orders for copper, lead and zinc came into effect on 31st January. Orders may be placed on the Directorate of Non-Ferrous Metals, Rugby, by telegram and, provided telegrams are handed in to the Post Office not later than 2 p.m., the orders they contain will be at the price ruling on the day of dispatch of the telegram. A licence will continue to be necessary before a sales contract can be completed and the amounts licensed will be limited to the quotas announced from time to time and notified to individual firms. All orders placed by telegram must be confirmed by letter with the necessary supporting documents and no steps will be taken to supply the metal until this written confirmation is received. Telegraphic orders handed in to the Post Office after 2 p.m. will be at the price ruling on the day following the date of handing in. Orders placed by letter will continue to be priced on the day following the day of posting. All inquiries arising out of this announcement should be made to the Directorate of Non-Ferrous Metals, 20, Albert Street, Rugby.

American Coke-Oven Contract

A contract has been obtained by Bristol's Instrument Co., Weymouth, from the United States for the instrumentation of a large coke-oven plant at St. Louis, Missouri, which is being built by Simon-Carves, Ltd. The contract for the instruments and the coke-oven plant was obtained in the face of keen American competition. The instrument control panel is 20ft long and 7ft high and incorporates instruments which measure, record and automatically control pressures, temperatures, and rate of flow. A number of new features are included. The panel, which would normally represent one year's delivery for the Weymouth factory, was completed in six months. It is to be installed at the Great Lake Carbon Co.'s new plant at St. Louis.

Batti-Wallahs' Society

Rear-Admiral S. M. Raw, who was to have addressed the Batti-Wallahs' Society at last week's luncheon, was unable to attend owing to illness, but the naval tradition for meeting emergencies was upheld by Rear-Admiral C. P. Clarke, who stepped into the breach. He chose as the subject of his address "Political, Economic and Social Conditions in Malta," on which he, as Flag Officer of Malta from 1948 to 1950, is well qualified to speak, and his address revealed an intimate knowledge of the conditions on the island.

Mr. T. C. F. Bigland, the "Mate," reminded

members of the ladies' night which will be on 28th March. The principal guest at the next luncheon of the Society (on 27th February), will be Mr. Desmond Heap, Comptroller and City Solicitor to the Corporation of London, who will speak on "The Origin and Development of Local Government."

A.S.E.E. Exhibition

An Electrical Engineers' Exhibition arranged by the Association of Supervising Electrical Engineers will be held at the Royal Horticultural New Hall, Greycoat Street, Westminster, S.W.1, on 28th and 29th March. Displays are being arranged by the British Electricity Authority, E.R.A., E.D.A., and electrical manufacturers. Admission will be by ticket, trade card or any engineering association membership card. Further information can be obtained from Mr. P. A. Thorogood, 35, Gibbs Green, Edgware, Middlesex.

Electrical Commercial Travellers

At a meeting of the Electrical Trades' Commercial Travellers' Association held on 11th January, Mr. C. Elvy, a past chairman of the Association, handed a cheque for £360 to Mr. H. Senior Fothergill, secretary of the Electrical Industries Benevolent Association, the proceeds from a Christmas draw among members.

The annual luncheon of the Association will be held on Friday next at the Connaught Rooms, Great Queen Street, London, W.C.2.

Television Aerial Convention

In anticipation of the opening of the new Wenvoe television station Belling & Lee, Ltd., are organizing a "television aerial convention" beginning early in March. Meetings will be held at Swansea, Cardiff, Bristol, Taunton, Exeter and, probably, Swindon at which popular technical lectures will be given lasting from 2½ to 3 hours. It is emphasized that these will not be "sales talks" but practical surveys of aerial design, construction and erection. Readers who wish to attend any of these meetings can obtain details from the company at Cambridge Arterial Road, Enfield, Middlesex.

Machine Tool Exhibition

The Machine Tool Trades Association, Victoria House, Southampton Row, London, W.C.1, is organizing an International Machine Tool Exhibition to be held at Olympia, London, from 17th September to 4th October next. Apart from Great Britain, there will be exhibits from leading machine tool manufacturing countries including the United States, France, Germany, Holland, Italy and the Scandinavian countries. The scope of the exhibition covers machine tools, engineers' small tools, gauges, measuring equipment, testing equipment, presses and hammers, heat-treatment plant and woodworking machinery.

New Solder Factory

H. J. Enthoven & Sons, Ltd., expect to start production in a new section of their solder factory at Croydon early in March. The output will consist mainly of "Superspeed" activated rosin cored solder, chiefly in the usual wire form, but provision has also been made to increase production capacity for cored ribbon. The new plant will also cater for other solder specialities, including for example coloured cored solder, which has been found of considerable value in the electrical industry, lamp solder and various soldering fluxes. The new factory floor will nearly double the existing area. The plant will include a 400-ton Fielding & Platt extrusion press for cored solder.

Lighting for Nylon Spinning

Spinning of nylon yarn is carried out under ideal conditions at the Pontypool factory of British Nylon Spinners, Ltd. The accompanying picture shows some of the 1,700 "Metrovick" 5ft 80 W fluorescent lamps and fittings installed in the coning section to provide an illumination of 25 lumens/sq ft on the working surfaces. A system of suspension devised by the electrical staff of British Nylon Spinners, using rod suspension and 1in conduit with junction boxes holding the ends of the fittings, ensures a uniform and symmetrical layout.

Metrovick fluorescent lighting at the British Nylon Spinners' factory, Pontypool

Works Visit

On 2nd January Earl de la Warr, the Postmaster General, paid a visit to the Strowger Works, Liverpool, of the Automatic Telephone & Electric Co., Ltd. After lunching with the directors and officials of the company, he made a tour of the factory and was shown Strowger automatic telephone equipment in all stages of manufacture. He was accompanied by Mr. H. A. Ashton (deputy regional director, N.W. Area), Col. R. E. Evans (head postmaster, Liverpool), Mr. H. C. Jones (telephone manager, Liverpool) and Sir Thomas Eades (vice-chairman and managing director, A. T. & E. Co., Ltd.). The tour concluded with a visit to the carrier transmission and switching systems laboratories of the company.

Earl de la Warr, Postmaster General (on extreme right) discussing radio telephone equipment with officials of the Automatic Telephone & Electric Co., during his visit to the Strowger works

Danish Equipment

For some years the Danfoss Manufacturing Co., established in Nordborg, Denmark, in 1933, has been represented in this country by Dean & Wood, Ltd., who have acted as its sole agents for automatic refrigeration control equipment. This arrangement will continue but in order to introduce to the British market its heating and electrical products the company has now opened offices at 69, Victoria Street, London, S.W.1, under the management of Mr. E. Bruhn. Among the automatic controls available for heating installations are thermostats for boilers, rooms, water heaters, heating pads and for temperatures above 212 deg F; thermostatic valves for steam and water; liquid level regulators; dial indicating thermometers, steam pressure controls and vacuum controls; controls and accessories for oil burners; relays and switches. Danfoss electrical equipment includes contactor starters, starting relays, automatic star-delta switches, reversers and pole changers.

The Blue Book

The 70th edition of the *Electrician* "Blue Book" (Electrical Trades Directory, 1952) contains in its 1,337 pages nearly 60,000 references. Continued growth in size and usefulness is evident in the 1952 edition. While the book's original character and purpose have persisted, the presentation of information has been varied from time to time to keep pace with new developments and to make reference easier as data have increased in volume and complexity. The various sections covering the activities of every branch of the industry and associated professional and trading organizations, are now arranged in a more convenient order. They have been revised throughout and the range of information expanded. Following the introduction of new headings in the classified section, the number of entries there has swelled noticeably and over 1,000 names have been added to the trade names section. The directory is published by Benn Bros., Ltd., Bouverie House, Fleet Street, London, E.C.4, at £2 10s including carriage.

Domestic Electrification in Switzerland

Some interesting observations on domestic electrical development in Switzerland were made by Miss K. E. Piatt, housecraft adviser in the Chester Sub-Area of the Merseyside & North Wales Electricity Board, and holder of the 7th Caroline Haslett Trust Travelling Exhibition, in a lecture given at the Institution of Electrical Engineers on 29th January. Her review covered a wide field and included such matters as electricity generation, tariffs, testing of equipment, showroom service, demonstrations, appliance manufacture and domestic science training.

Belfast Appointment Controversy

The controversy over the appointment of a deputy electrical engineer and manager of Belfast following the resignation of Mr. J. M'Candless to take up another appointment reached another phase last week when Alderman W. H. Cooper, chairman of the Electricity Committee, resigned, and the city electrical engineer, Mr. W. Girvan, announced his intention of resigning. It may be recalled that the Finance Committee recommended that the post should be filled by a member of the Department. When the Electricity Committee met

last week it considered four applications for the post, and Mr. R. P. Watson, sales manager, was recommended for the appointment, subject to confirmation by the Corporation.

In a Press statement Alderman Cooper said that the city electrical engineer had prepared a number of questions so that the members of the Committee might be able to form an opinion on the suitability of the applicants. He and the city electrical engineer were not permitted to put the questions, whereupon the Alderman resigned the office of chairman. Mr. Girvan declared his intention of resigning if the Corporation confirmed the recommendation of the Electricity Committee. During the discussion he suggested that the applications should be referred to the President of the Institution of Electrical Engineers (Sir John Hacking) but that was rejected.

At a meeting of the City Council last Friday, Mr. Watson was appointed to the position at a salary of £1,505, the maximum of that grade. The recommendation of Mr. Watson by the Finance Committee was approved by 30 votes to 12, an amendment that the matter be referred back to the Electricity Committee having been defeated by the same majority. Mr. Watson has had 29 years' experience in the Department. He is a B.A. and Bachelor of Engineering of Trinity College, Dublin and a past-chairman of the Northern Ireland Centre of the Institution of Electrical Engineers. Sir William Neill, a former Lord Mayor, said that Mr. Watson's academic qualifications were not exceeded by those of any other officer of the Department. The Council was the authority which appointed its own officers, and it intended to maintain that right.

Liquid Fuels

A course of evening lectures on "Liquid Fuels, Their Properties and Utilization," will be delivered by Mr. G. F. J. Murray on Tuesday evenings, commencing on 26th February, at the Northampton Polytechnic, St. John Street, London, E.C.1. Further particulars can be obtained from Mr. J. E. Garside, head of the Department of Applied Chemistry.

Production in Russia

A report on economic development in the Soviet Union prepared by the United Nations Economic Commission for Europe states that in the post-war years Russian heavy industry has grown enormously. The output of the engineering industry as a whole increased by 130 per cent between 1940 and 1950, according to the report on the Five-year Plan, and by a further 21 per cent in 1951.

Among major construction projects are the hydro-electric power stations on the Volga, Don and Dnieper which, it is said, will raise Russia's electricity output by 22,500 million kWh a year, or one-fifth. The execution of these large undertakings places extremely heavy demands upon manpower resources and upon the steel, cement and heavy electrical engineering industries in particular and these undertakings seem to have been given precedence over various other projects of more modest dimensions which compete for the same resources.

Transmitter for Denmark

A contract worth £90,000 for a high-power broadcasting installation has been placed by the Danish Directorate General of Posts and Telegraphs with Marconi's Wireless Telegraph Co., Ltd., through its Danish agents Sophus Berendsen A/S. The new station, which it is hoped will be opened in Kalundborg at the end of 1953, will be one of the highest power in the world and will be completely air-cooled.

Marconi's have previously completed two 100 kW stations—one at Kalundborg and the other at Skive—which now carry the Danish "No. 2" programme. The new 200 kW installation will carry the "No. 1" programme. The complete Danish high-power broadcasting system will then be Marconi designed and installed. It will comprise two Marconi 100 kW transmitters with paralleling equipment, capable of an output of 200 kW. These are the highest power air-cooled transmitters yet designed, and they eliminate the usual large reservoir and pumping apparatus needed for water cooling systems. Similar installations have been ordered by Argentina and Norway, and some months ago the B.B.C. started broadcasting its Third Programme from Daventry with such a 200 kW transmitter.

Oil Tanker Orders

The General Electric Co., Ltd., has received orders from the Eagle Oil and Shipping Co., Ltd., and the Anglo-Saxon Petroleum Co., Ltd., for the complete electrical equipment for ten tankers. Each equipment includes two G.E.C. 550 kW, 440 V, three-phase alternators, gear driven by steam turbines at 1,200 r.p.m. In seven ships the steam turbines are being supplied by Peter Brotherhood, Ltd., and in three by the Fraser & Chalmers Engineering Works of the G.E.C. Each tanker will also have one 200 kW G.E.C. alternator, diesel driven at 600 r.p.m. and about 25 motors ranging from 1·5 h.p. to 178 h.p. for pumps, fans, steering gear and other duties. The switchgear will comprise a steel cubicle type main switchboard, with withdrawable air break circuit breakers, for controlling the generators, power supply, lighting and auxiliary services; also two group starter switchboards for controlling the motors.

Sales Management Examinations

The Council of the Incorporated Sales Managers' Association announces that the qualifying and final examinations in "Sales Management" will be held in London and

various provincial centres on 22nd, 23rd and 24th May. Particulars may be obtained from the Secretary, I.S.M.A., 4, Holborn Place, W.C.1. The closing date for entries is 30th April.

The Association is introducing next year a revised six-subject qualifying examination in lieu of the present qualifying examination, consisting of three subjects only, thus bringing it into line with the National Certificate Scheme in Management Studies.

B.T.H. Activities

Two references on page 189 of our 25th January issue, in the review of the British Thomson-Houston Co.'s activities in 1951, may be misleading. The first is to No. 4 generator transformer at the Staythorpe power station. This was not then in an advanced state of erection: it is due for completion this year. The second reference is to the three 120 MVA 275/132 kV transformers for the line between Staythorpe and West Melton. These were ordered in 1951—not completed.

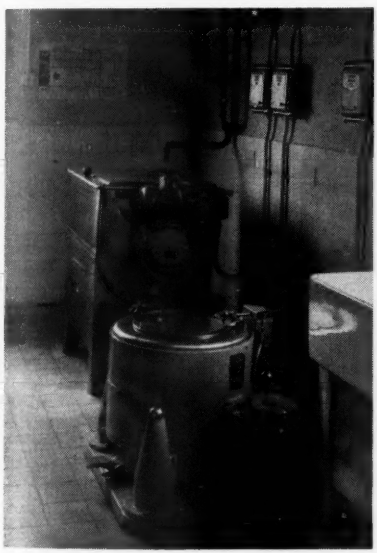
Communal Laundry Equipment

A Swedish made washing machine and a hydro extractor have been introduced into this country by Electrolux, Ltd. Having a capacity of 22 lb of dry clothes, the washing machine is large enough to handle a full family wash in one operation. Both units are electrically driven (by ⅓ h.p. and ½ h.p. motors respectively) and the washing machine is supplied for heating by either gas or electricity, the consumption per wash being respectively ¼ therm or 7 kWh. The nominal rating of the heating elements is 10 kW. The revolving drum makes 32 r.p.m., washing on a cycle of eight forward revolutions and then eight in reverse.

It is generally reckoned that one washing machine will serve the needs of 25–30 families and one hydro extractor (14½ lb dry weight capacity) is sufficient to serve two washing machines.

One of the first all-electric installations (a single washer and hydro extractor) has been completed at the Chelsea Borough Council's Cremorne Estate, Riley Street. A two washer pilot installation (gas heated) at Mandeville House on the Wandsworth Borough Council's Notre Dame Estate, Clapham, is being used by 76 families and is to be followed by four further laundries on the same estate, comprising six washing machines and four hydro extractors.

Laundry installation at Cremorne Estate, Chelsea



Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £148 0s 0d
COPPER, H.C. Electro	ton £227 0s 0d
Fire Refined 99·7 per cent	ton £226 0s 0d
Fire Refined 99·2 per cent	ton £225 10s 0d
COPPER Tubes	lb 2s 2d
Sheet	ton £230 0s 0d
H.C. wire and strip	ton £234 0s 0d
LEAD, English	ton £171 10s 0d
Foreign	ton £170 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £997 10s 0d
ZINC, G.O.B. Foreign	ton £190 0s 0d
Electrolytic	ton £194 0s 0d
BRASS Tubes	lb 2s 1d
Sheet	lb 2s 4¾d
Wire	lb 2s 7¾d
PHOSPHOR BRONZE	
Wire	lb 3s 7¼d
RUBBER, No. 1 R.S.S. spot	lb 38¼d–38¾d

Catalogues and Lists

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Illustrated priced leaflet (A.169/S) on "instant-self-start" fluorescent lamps and tungsten ballast lamps.

Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.—Five technical publications on ring roll mills (9102), swing sledge mills (8901), roll jaw crushers (9401), rotary fine crushers (9301) and batch mixers and blenders (8501).

Foster Instrument Co., Ltd., Letchworth, Herts.—Illustrated catalogue of thermo-electric pyrometers (No. 103).

Westool, Ltd., St. Helen's, Auckland, Co. Durham.—Technical brochure on "Westool" a.c. solenoids (series 700) pull and thrust types.

TRADE PROSPECTS IN VENEZUELA

Plan to Construct National Grid

THE market for electrical goods in Venezuela is largely dominated by the United States although in the field of domestic electrical appliances and materials British electrical goods are now being imported in small quantities. In his report on the economic and commercial conditions in Venezuela* Mr. A. C. Maby, First Secretary (Commercial) to H.M. Embassy at Caracas, says that small supplies of cable have been imported from the United Kingdom, but prices are reported to be too high. Up to the present the chief supplier of generating plant has been the United States, though the Venezuelan Development Corporation has latterly shown interest in plant from the United Kingdom.

Oil companies have been large purchasers of plant from the United States and Great Britain. There is a good market for diesel engines from 10 to 130 b.h.p. of which British manufacturers are obtaining a share. In view of the natural petroleum gas which is available at various points in Venezuela British makers of gas turbines should consider the possibilities of this market for turbo-generating plants of 800 b.h.p. and upwards. The market for electric motors and fans is to a great extent in the hands of the United States, although important British manufacturers are represented in Venezuela.

Domestic Appliance Market

Dealing with domestic equipment Mr. Maby says that almost every known type of electrical appliance is available. Everything is imported as there is no manufacture or assembly in Venezuela of electrical appliances. Stocks are at present so high that retailers are hard put to it to devise new methods of persuading the public to buy. Irons, wireless sets, toasters, etc., are given away to purchasers of expensive items such as refrigerators, washing machines, cookers, freezers, dish washing and automatic ironing machines. The market is almost exclusively supplied from the United States, although British vacuum cleaners are beginning to get a hold on the market. A large portion of the telephone equipment being installed in the country continues to come from the United Kingdom.

Power Development

Electricity production in Venezuela in 1949 totalled 476·5 million kWh, compared with 401 million kWh for 1948. It is calculated that approximately 105 kWh is now produced per head of the population and that present generating capacity represents some 28 W per inhabitant. Existing generating plants, excluding those operated by the petroleum companies, have a total capacity of 140,642 kW. Most of the provincial towns and villages receive electrical power from local diesel-electric plants, ranging from 3 kW to 18,500 kW. Plans for a national grid have been drawn up to link the main centres of population in Western, Central and Eastern Venezuela with large-capacity generating stations able to provide electricity at reasonable prices.

The Electricity Department of the Venezuelan Development Corporation, which is responsible for the planning and execution of all projects relating to national electrification, has completed a plan which provides for dividing the country into four zones which will eventually be linked up by a grid system. A number of new power stations will be constructed in each zone. These will have capacities ranging from 826 kW to 50,000 kW; some are to be finished in 1951 and the whole constructional programme is planned for completion by 1955. These stations will be either hydro-electric, thermo-electric or diesel-electric, the largest (50,000 kW) being a hydro-electric station on the Caroni River. The thermo-electric and hydro-electric plants already functioning in the Federal District, and also the larger provincial generating stations, will form a part of the national grid; many of the smaller provincial plants will be eliminated as soon as supplies from the grid become available in each district.

* Published for the Board of Trade Commercial Relations and Exports Department by H.M. Stationery Office, 7s net.

Thermal Storage Space Heating

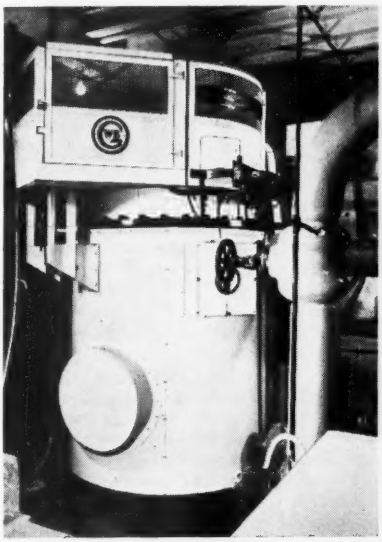
Installation at B.E.A. Divisional Headquarters

AN electrode boiler storage space heating system has been installed at British Electricity House, East Didsbury, Manchester, the headquarters of the North Western Division, British Electricity Authority, to take full advantage of the twelve off-peak hours of the 24-hour day, when energy is available at favourable rates.

The heat stored in the system tanks is drawn off to warm the building interior mainly during the period of occupancy which coincides with the period of peak electricity demand. The installation is sufficiently automatic in operation to dispense entirely with attendant labour.

The thermal load of the buildings, including future extensions, was estimated to be 2,000,000 B.Th.U./hour when 65 deg F is maintained inside and the external temperature is 32 deg F. The various buildings are occupied between 9 a.m. and 5 p.m. It was deemed advisable not to allow the structure to go cold during the night hours, and for that purpose circulation to the extent of one-third of the maximum load was allowed for during the night hours between 5 p.m. and 7 a.m., with a two-hour pre-heating boost from 7 a.m. to 9 a.m.

The plant consists of an 800 kW "Autolec" h.v. electrode water heater manufactured by G.W.B. Electric Furnaces, Ltd., and the necessary storage vessels, pumps, mixing valves, etc., which were designed and installed by G. N. Haden & Sons, Ltd. The storage temperature of the water is 230 deg F and the required storage capacity after allowance had been made for the heat loss from the cylinders and the expansion of their contents was estimated at 32,000 gall. The boiler house already existed and it was decided to install three cylinders, each 33ft long and 7ft in diameter, and one cylinder 27ft long and 7ft in diameter. The static head necessary to permit a safe working temperature of 230 deg F is afforded by a secondary feed tank installed in the roof with a capacity sufficient to accommodate the expansion of the water contained in the whole system.



The 800 kW h.v. electrode water heater

Between the water heater and the storage tank is a high velocity centrifugal circulating pump with water cooled bearings. High velocity circulation within the water heater was decided on to prevent steam formation on the electrodes at high temperatures.

To ensure an even temperature gradient of water within the storage vessels an automatic mixing valve is installed on the primary side of the circuit before the high velocity circuit pump. This prevents water at an incorrect temperature entering the tanks. In each cylinder are three thermostat pockets situated at the top, centre and bottom. Since the temperature within the vessels is built up in layers, from the top downwards, by inserting the controlling thermostats as required in these pockets, the electrode boiler can be closed down when any pre-determined level of storage within

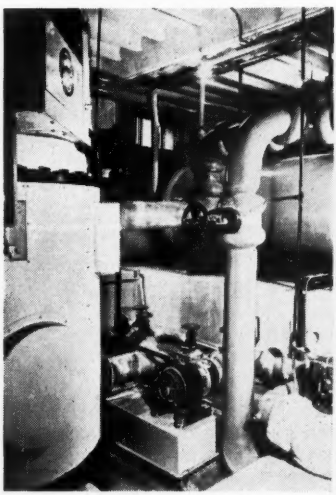
these limits is reached. Thus, in extremely mild weather when the total heat content of the tanks is not required, the thermostats can be arranged to provide only one-third or two-thirds of the maximum heat storage. These thermostats close down the boiler when the selected charging point has been reached.

On the heat distributing side of the system, a normal low pressure heating scheme is employed, and provision is also made for a supply of domestic hot water. Flow and return design temperatures for the heating system are 180 deg F and 150 deg F, respectively. A further mixing valve is installed in the secondary flow main; this is controlled by an immersion thermostat in the secondary flow following the mixing valve. This thermostat operates in conjunction with an outside temperature controller by means of a pilot acting through a calibrator box; so, should the external temperature rise, the flow temperature of the heating circuits would fall and should the external temperature fall, the flow temperature would rise.

To provide for the changes in the internal temperatures a time switch is included in the secondary system mixing valve circuit which switches the heating system over to night time temperature operation. This maintains the temperature throughout the building at a value of some 10 deg F less than the daytime temperature. The mixing valve is then still compensated for outside temperature conditions by means of the pilot, and the inclusion of this instrument permits the system to circulate just that amount of heat which will satisfy the demand at any particular time. The actual heat dispersion from the system is effected by hot water radiators.

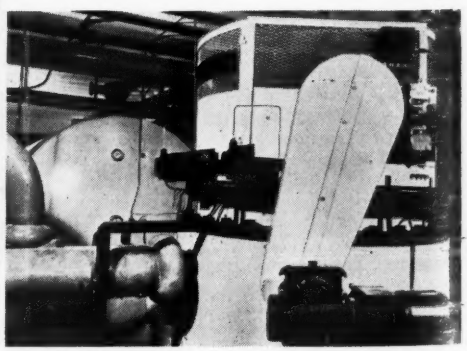
The domestic hot water supply is provided by a calorifier served from the heating mains from the storage plant during the winter time, and by electric immersion heaters during the summer when the heating system is closed down. Both the primary and secondary circuits have standby duplicate circulating pumps connected in parallel and these pumps can be brought into operation by a change-over switch in the event of failure. In order to prevent excessive heat being lost from the tanks and pipe work within the plant room, external surfaces of the tanks, pipes, etc., are lagged with 3in thick 85 per cent magnesium slabs set in plastic finish.

The boiler is supplied at 6·6 kV direct on to the electrodes, and it is loaded at 800 kW. All the control gear, motors, etc., are supplied at 415 V. The boiler is equipped for "automatic rating"; i.e., the load is automatically varied in accordance with the demand placed on it. Also it is equipped with automatic temperature control. Both temperature and rating controls operate by varying the positions of porcelain shrouds



Left: **High velocity circulation prevents steam formation on the electrodes; external pump and mixing valve**

Below: **Heat stored in the system tanks (one shown in rear) is drawn off to warm the building interior; electrode shrouds driven by external motor**



ove the electrodes by a motor-operated cen al driving shaft which passes through the op of the boiler and transmits to the shr ds through gearing.

e interior of the boiler is very simple, the only moving parts being the porcelain shr ds. No interior circulating pump is ecessary; jets in the base of the bo r, in conjunction with variable baffles, pr ide sufficient velocity within the bo r from the basic primary circulation to revent steaming, etc., on the electrode su ces. The whole boiler equipment is co pletely interlocked and fitted with saf y devices which include phase failure pr ection, overload, no-volt and h.v. interlocks which prevent high voltage supply being switched on until all parts of the system are in operation and l.v. supply is available. Altitude gauges prevent changes in the system such as lowering pressure because of water loss or increasing pressure because of steaming, which would result in increase of temperature or other undesirable occurrence. The whole equipment is controlled by a master time switch which ensures that the primary pumps are in operation fifteen minutes before the high voltage supply is switched on. This time switch also controls the whole sequence of the automatic operation.

Excess temperature thermostats fitted to all tanks and to the electrode boiler itself, ensure that the h.v. supply is switched off in the event of a dangerously high temperature being created in the system.

Labour Control Order

THE Minister of Labour and National Service, Sir Walter Monckton, has made the Notification of Vacancies Order, 1952 (S.I. No. 136, H.M. Stationery Office, 3d), which comes into operation on 25th February. The object of the Order is to ensure that all those who want to change their employment and all those who are looking for work are guided into jobs which are not only suitable for them but are also of importance to the nation. There will be no "direction" to work as there was under the old Control of Engagement Order. Workers covered by the Order are under no obligation to take jobs they do not want. They will be told of the important vacancies and asked to take them willingly. If they decline to do so they will be offered vacancies in the kind of work they desire.

With certain exceptions, the Order restricts and controls the way in which employers may (*a*) seek to engage any worker and (*b*) engage men between 18 and 65 years of age or women between 18 and 60 years of age. An employer must not "seek to engage" except by notifying a vacancy to an Employment Exchange or a scheduled employment agency or by an advertisement that requires a worker answering it to go to an Employment Exchange or a scheduled employment agency. Actual engagements must be made through an Employment Exchange or agency.

Certain industries, e.g., coalmining, are exempted from the operation of the Order, as are those people employed in a managerial, professional, administrative or executive capacity. Part-time or unpaid employment does not come within the scope of the Order. "Part-time" employment means employment that does not amount to more than 30 hours a week in all. "Managerial capacity" means employment as a salaried employee in charge of a department, a works or an office. This includes superintendents, general foremen, and head foremen in charge of other foremen, but not foremen, chargehands, piece workers or anyone who is paid by the hour. Employment in a "professional, administrative, or executive capacity" includes accountants, architects, journalists, solicitors, doctors, dentists, nurses and midwives, secretaries of clubs or companies or institutions, surveyors, teachers, clerks of works, and a number of other non-manual occupations.

A "scheduled employment agency" is an organization, such as a trade union, which has been authorized by the Minister to undertake the placing of people in employment under arrangements approved by the Minister and in accordance with directions given by him.

The employer can still advertise, but the advertisement must make it plain that applicants for a job must apply to an Employment Exchange or scheduled agency. In exceptional cases an Employment Exchange may permit an employer to advertise without this restrictive condition.

If an employer gives a worker not excepted from the Order a job which is covered by the Order without either of them going to the Exchange or scheduled agency, the employer is liable to prosecution. A worker not excepted from the Order will only be able to get a job by going to an Employment Exchange or to a scheduled agency because otherwise an employer cannot legally engage him.

NEW BOOKS

Electric Lighting. By C. E. Gimson. Pp. 224; figs. 79; index. Cleaver-Hume Press, Ltd., 42a, South Audley Street, London, W.1. Price 9s 6d.

This is an excellent book on practical lighting. The author has covered a wide field in a comparatively small volume, so that the treatment is necessarily general rather than detailed. About a quarter of the book is devoted to fundamentals and another quarter to electric lamps and lighting fittings. The other half deals with a wide range of lighting applications. These include industrial, school and domestic lighting and lighting for indoor games; there is a very short chapter on outdoor lighting and a rather longer one on advertisement and display lighting. Then there are 30 pages of tables, including utilization factors and the I.E.S. schedule of illumination values. The book concludes with some 70 test questions.

The treatment is generally sound but an unfortunate exception occurs on page 45 where the author gives a definition of brightness based on the flux emitted per unit area by an illuminated surface such as a wall or bench top: he specifically writes of " a brightness of 10 lumens/sq ft." He is, unfortunately, not alone in his misconception of the definition of brightness in terms of the flux emitted per unit area by a *perfectly diffusing surface*, but it is regrettable that the confusion should be perpetuated in a book which, although " addressed primarily to the lighting contractor and electrician," may very well get into the hands of students.—J.W.T.W.

Theory and Design of Valve Oscillators. By H. A. Thomas, D.Sc., M.I.E.E. Pp. 317; figs. 157; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 36s.

The name of Dr. Thomas has been associated with problems of frequency stability in valve oscillators for nearly 30 years. The present work, first published in 1939 and now re-issued as one of the Electrical Engineering Monographs, contains some 300 pages of concise information covering all the theoretical aspects of valve oscillator design.

Two thirds of the book is concerned with LC oscillators, their basic types, conditions of operation, frequency stability and methods of stabilization. The author shows that the main causes of frequency variation do not lie in the valve but in the oscillatory circuit itself, and he suggests that the high repute of the crystal oscillator has led to an unwarranted neglect of the LC oscillator which can combine stability with considerable flexibility.

Five chapters then follow dealing with RC, crystal, u.h.f., velocity-modulated and magnetron oscillators. Since these occupy only a hundred pages between them the information is necessarily less detailed, but each chapter provides a concise and concrete summary of the art.

The author does not hesitate to use mathematics where necessary because the true effects are not disclosed by simple linear theory, but this will prove no handicap to the serious designer, particularly as the conclusions are summarized in physical terms. A bibliography with 172 references and a comprehensive and accurate index complete an excellent contribution to technical literature.—J.H.R.

Materials Technology for Electron Tubes. By Walter H. Kohl. Pp. 493; figs.; tables and index. Chapman & Hall, Ltd. Price 80s in U.K.

This American volume contains a comprehensive collection of information on the materials used in the construction of valves and it is the first book of its kind to be published in English. The materials considered include glass, ceramics, mica, tungsten, molybdenum, tantalum, copper, nickel and graphite. Each chapter dealing with these materials has an extensive tabulation of the physical characteristics and the chemical reactions taking place with various reagents. Attention is also given to the processes employed in the application of these materials. Another feature of the book is a critical review of the work done throughout the world by many research workers. Much of the data and descriptions of processes is published for the first time.

Although expensive this book will undoubtedly be of great value to the valve engineer, development engineer, experimental physicist, chemist, materials engineer and technician in any field where these materials are used.—R.P.

ELECTRICITY SUPPLY

Power Station Consent

Tariff Standardization

THE British Electricity Authority has received the consent of the Ministry of Fuel and Power to the establishment of a new power station at Wakefield, Yorks, and to the extension of Dalmarnock generating station, Glasgow. The Wakefield (New) station, which will stand on a site of approximately 126 acres, will have a capacity of 240,000 kW, comprising four 60,000 kW turbo-alternators and four 550,000 lb/hr boiler units. The extension of the Dalmarnock station comprises two 60,000 kW sets and six 200,000 lb/hr boiler units.

Glasshouse Heating

It was reported at a meeting of the Midlands Consultative Council in Birmingham last week that the Electricity Board had announced a change in the tariff for heating glasshouses on farm premises. Instead of paying for 30 kWh per 1,000 sq ft at 4d/kWh this initial charge will now apply to 30 kWh per 5,000 sq ft of floor space.

S.E. Scotland Tariff Revisions

For the current financial year the S.E. Scotland Electricity Board anticipates a deficit of £100,000. Among other increases in costs, those in coal and freight charges since 1st January last mean that the Board will have to pay for its bulk supplies on a fuel cost 6s 6d a ton higher, adding £300,000 a year of which about half will be recovered from industrial and large commercial consumers. Moreover, the Board has been informed by the Central Authority that the bulk supply kW charge will go up by 3s in April next and by a further 2s in April, 1953. The Board is therefore introducing revised charges and at the same time a standard domestic tariff will take the place of 24 existing rates. All commercial tariffs which do not include a coal clause will be raised by 10 per cent as a temporary measure pending standardization. Under the standard farm tariff (4½d—1½d—¾d) the lowest rate will be raised to ⅞d. The charges are estimated to increase revenue by £400,000 a year of which £305,000 will come from domestic consumers.

DOMESTIC TARIFF. All areas except Edinburgh, Kirkcaldy, Falkirk and Newton. Primary charge 4½d/kWh (prepayment 5d) for first 120 kWh a year or 60 kWh per room whichever is the greater (the number will be apportioned according to the routine meter reading periods on a pro rata basis). Secondary charge ¾d/kWh for all additional consumption. No meter rents will be charged. Edinburgh and Newton: Primary charge 3½d/kWh (prepayment 3¾d), otherwise as for general tariff. Kirkcaldy and Falkirk: Same as general tariff but number of kWh at primary rate 96 or 48 per room whichever is the greater.

South Wales Standard Tariffs

Provisional proposals for the standardization of tariffs have been announced by the South Wales Electricity Board. It is explained that since the proposals were initiated the Board has had to meet substantially increased costs, but it is considered desirable to keep tariff increases separate from standardization and revisions for raising additional revenue will be submitted in the near future. Under the present scheme prepayment and credit consumers will be charged on exactly the same basis except that there will be a prompt payment discount of 2½ per cent for credit supplies (other than tariffs subject to a coal clause). Meter rents will be discontinued. The new tariffs are as follows :—

DOMESTIC TARIFF. Primary charge of 4½d/kWh for first 20 kWh a quarter where there are not more than two rooms, a further 10 kWh per room up to ten rooms and 5 kWh for any in excess of ten. Secondary charge 0·85d/kWh.

COMMERCIAL TARIFFS. Block rate tariff where demand does not exceed 50 kW. Primary charge 4½d/kWh and secondary charge 0·85d/kWh. Number of primary kWh: Shops, 20 for first 60 sq ft of area and 5 for each additional 15 sq ft. Churches, chapels, public halls and the educational and non-residential portions of schools and colleges: 20 for first 400 sq ft and 5 for each additional 100 sq ft. Other premises: 20 for up to 120 sq ft and 5 for each additional 30 sq ft.

Two-part maximum demand. Applicable where demand exceeds 20 kW. For each kW of m.d. in year of supply, £5 12s 6d. Secondary charge 0·68d/kWh ± ·0008d/kWh for each 1d variation in cost of coal from the basic 38s a ton;

INDUSTRIAL TARIFFS. Block rate where m.d. does not exceed 50 kW. For each 1,000 kWh a month, 2d/kWh. for next 5,000, 1·75d/kWh; additional consumption at 0.85d/kWh. Where supply is metered at voltages above 650 V, reduction of 10 per cent.

Two-part for supplies above 20 kW m.d. For each kW of m.d. a year, £5 12s 6d (or alternatively 11s per month) and 0·68d/kWh with ·0008d/kWh coal price clause. For supplies at over 650 V the annual m.d. charge is £5 2s 6d and monthly charge 10s, with secondary charge 0·62d and a ·00074d/kWh coal price variation clause. Average price per kWh under two-part tariff will not exceed that under first two steps of appropriate industrial block rate tariff. Both tariffs subject to adjustment for low power factor.

The Board's new proposals were accepted by the South Wales Electricity Consultative Council last week. Mr. L. Howles (chairman of the Board), introducing the proposals to the

Council, said the preparation of the domestic tariff had been a difficult task. Quite apart from the actual tariff there had been administrative problems and that was one of the reasons why it had been decided to try out the tariff in the Western Sub-Area and so get experience. He said that about 0·1 per cent of the consumers had refused to supply the information or allow an official of the Board to count the number of rooms in their houses. These people were quite entitled to their principles, but for them the tariff must be 4½d/kWh no matter how much electricity was consumed. The new tariff was planned to come into effect for the electricity bills covering the first meter readings made after 1st April.

B.E.A. Contracts

During the past month, the British Electricity Authority has placed contracts for equipment for power stations, transforming stations and transmission lines amounting in the aggregate to £13,516,471. The principal contracts include the following :—

Brighton "B" power station : Six 320,000 lb/hr boilers.—Babcock & Wilcox, Ltd. East Yelland station, nr. Barnstaple: Four 180,000 lb/hr boilers.—John Thompson Water Tube Boilers, Ltd. Tilbury station : Three 540,000 lb/hr boilers.—John Thompson Water Tube Boilers, Ltd.; circulating water valves.—J. Blakeborough & Sons, Ltd. Goldington station, Bedford : Generator and station transformers.—Hackbridge & Hewittic Co., Ltd. Ince station, nr. Ellesmere Port : Structural steelwork.—Horseley Bridge & Thos. Piggott, Ltd. Bold station, St. Helens, Lancs. : Superstructure for main and ancillary buildings.—John Laing & Son, Ltd. Thornhill station, nr. Dewsbury : Condensing and feed heating plant.—Vickers-Armstrongs, Ltd. Stella South station, nr. Newcastle-on-Tyne : Three 550,000 lb/hr boilers.—Clark, Chapman & Co., Ltd. Stella North station, nr. Newcastle-on-Tyne : Three 550,000 lb/hr boilers.—Clarke Chapman & Co., Ltd. Chadderton station, Oldham : Superstructure to main buildings.—J. Jarvis & Sons, Ltd. Huncoat station, Accrington : Three 305,000 lb/hr boilers.—Simon Carves, Ltd.

Payment to B.E.A.

A dispute between the Newcastle-on-Tyne City Council and the British Electricity Authority over a balance of £3,461 in the Benwell and Fenham Electric Lighting Order reserve account at 31st March, 1948, has been settled, the Corporation having agreed to the transfer of the money to the B.E.A. It had contended that the money was part of the general rate fund, but the Transport and Electricity Committee reported that in two other similar disputes the Minister of Housing and Local Government had adjudicated in favour of the B.E.A.

Protest Against New Charges

Concern was expressed recently by the Caithness Finance Committee over the North of Scotland Hydro-Electric Board's revised scale of charges for the introduction of electricity to rural areas. This scale involves an annual capital charge of £1 per room for a period of ten years. Consideration of a tender for electrical work in the 140 Council houses is to be deferred pending the result of the Council's request for a meeting between its representatives and the chairman or deputy chairman of the Board.

At a meeting of East Caithness Branch of the National Farmers' Union at Wick it was unanimously decided to recommend the executive to urge that the whole county be put on the same basis regarding rentals and charges for electricity. Members are dissatisfied with the speed of installation of electricity to the rural areas.

Life of Street Lamps

Stretford Corporation Highways Committee has considered statistics relating to the average life of lamps used for street lighting in Plumbley Drive. These show an average burning life in excess of 1,000 hours, except in one case where a lamp failed immediately upon operation. Extensive tests made before the war revealed an average life of 700–800 hours. It was noted in the report that manufacturers estimate the average life of lamps at 1,000 hours under favourable conditions, but this average is not expected to be reached by street lamps.

Electricity in Sweden

Electricity consumption in Sweden in 1951 totalled 19,350 million kWh and in addition, 150 million kWh was exported to Denmark. The annual increase during the past few years has been approximately 1,200 million kWh.

Australian Electrical Trade

DURING the twelve months ended June last imports into Australia of dynamo-electric machinery and electrical appliances and equipment were valued at £A27,920,000, an increase of about 12 per cent on the preceding twelve months. The only group showing a decline was cable and wire. The following table compares the 1950–51 and 1949–50 values.

Class of Import	1949–50 £A (000)	1950–51 £A (000)
Batteries and accumulators ..	529	544
Cable and wire, covered ..	5,802	4,557
Communication equipment, including radio	6,784	7,413
Dynamo-electric machines ..	4,851	5,664
Lamps, filament	642	861
Protective equipment	562	609
Regulating, starting and controlling apparatus	2,118	3,537
Transformers and rectifiers ..	874	2,010
Other electrical machinery and appliances	2,298	3,225

Exports from Australia of electrical appliances and equipment during the fiscal year 1950–51 totalled £A1,488,000 in value of which £A314,000 represented communication equipment. The corresponding figures for 1949–50 were £A1,314,000 and £A424,000.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Associated Electrical Industries, Ltd.—The proposed increase of the authorized capital from £10,000,000 to £18,000,000 by the creation of 5,000,000 additional ordinary shares of £1 each and 3,000,000 unclassified shares of £1 each was approved at an extraordinary general meeting held on 31st January. Following the authorization of this increase of capital 2,217,649 of the unissued ordinary shares will be offered at 60s a share to the holders of the existing ordinary stock in the proportion of one new share for every £3 of ordinary stock held.

The Automatic Telephone & Electric Co., Ltd., will shortly be making an issue to ordinary and deferred stockholders of 544,000 new £1 ordinary shares. The issue will take the form of a "rights" issue of two new ordinary shares at 45s per share, for each £5 of ordinary or deferred stock held. Permission has been received from the Capital Issues Committee. The issue has been underwritten by Telephone & General Trust, Ltd.

British Insulated Callender's Cables, Ltd.—At an extraordinary meeting held on 29th January a resolution was approved to increase the capital to £17,500,000 by creating 5,000,000 additional £1 ordinary shares.

The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., a subsidiary of the British Tyre & Rubber Co., Ltd., reports a net profit of the group for the year to 30th September last, after taxation of £198,999, of £184,080, as compared with £128,541 for the preceding year, and after adding other sums the balance available is £193,108. Of this amount £16,635 is carried forward in the books of subsidiaries, leaving £176,473 available for appropriation by the company. The fixed ordinary dividend of 6 per cent has been declared, and an additional dividend of 3 per cent, making 9 per cent for the year. On the preferred ordinary an additional 2 per cent beyond the fixed dividend of 6 per cent has been declared, making 8 per cent. Similar payments were made for the previous year.

The Morgan Crucible Co., Ltd., has declared an interim dividend of 3¾ per cent (unchanged).

Electrical Components, Ltd., is paying an unchanged interim ordinary dividend of 7½ per cent.

Scottish Cables, Ltd., has declared an interim dividend of 10 per cent (same), on enlarged capital.

New Companies

A. R. D., Ltd.—Registered 16th January. Capital £10,000. Manufacturers of and dealers in domestic and commercial refrigerators, cabinets, coldrooms and refrigerating plant, etc. Permanent directors: D. P. Toomey, J. H. P. Dalton, E. A. J. Soulby and A. J. Day, all directors of D. P. Toomey & Co., Ltd. Secretary: J. H. P. Dalton. Regd. office: Prudential Buildings, 99, Mount Pleasant Road, Tunbridge Wells, Kent.

Victor Safety Irons, Ltd.—Registered 18th January. Capital £100. To acquire from Maurice and Henry Victor, develop and turn to account Letters Patent 594,810 relating to electric irons, to manufacture and deal in articles incorporating such inventions, etc. Directors: M. Victor, H. Victor and H. W. Hughes. Regd. office: 39, Ridinghouse Street, W.1.

Easiway Electrical Co., Ltd.—Registered 23rd January. Capital £7,500. Dealers in electrical goods of all kinds, and radio equipment. Directors: T. Flynn and Florence Flynn. Secretary: T. Flynn. Regd. office: 68, Cross Street, Manchester, 18.

Hamman & Walker, Ltd.—Registered 26th January. Capital £4,000. Electrical and electronic engineers and contractors, etc. Directors: E. Hamman, Dorothy Hamman, E. Walker and Jean B. Walker. Regd. office: 7, Bolton Road, Walkden, Lancs.

Talking Devices, Ltd.—Registered 26th January. Capital £1,000. Manufacturers of recording and reproducing devices, etc. Directors: H. L. Fletcher, Mrs. Ruth I. Fletcher and C. F. Garner. Regd. office: 6a, Whitehorse Street, Piccadilly, W.1.

British Fibrak Separator Co., Ltd.—Registered 25th January. Capital £1,000. To acquire from Oldham & Sons, Ltd., of Denton, nr. Manchester, the world rights in the Fibrak separator for use in electric storage batteries; to manufacture and vend such separator, and to carry on the business of mining, mechanical and electrical engineers, manufacturers of miners' lamps, electrical storage batteries, etc. The first directors are

to be appointed by the subscribers. Solicitors: Platt & Co., 4, Albert Square, Manchester, 2.

Selecta Portable Electric Tools, Ltd.—Registered 29th January. Capital £500. Directors: J. Frye and E. A. Elmore, both directors of B. Elliott & Co., Ltd. Secretary: Joseph T. Ubee. Regd. office: 116, Victoria Road, N.W.10.

Edwin Crook & Co., Ltd.—Registered 29th January. Capital £1,000. Radio, electrical, mechanical and general engineers and contractors, etc. Directors: S. C. Wheeler and Mrs. W. Wheeler. Secretary: Winifred Wheeler. Regd. office: 6, Carnaby Street, W.1.

T. Walters, Ltd.—Registered 30th January. Capital £200. Electrical engineers and contractors, etc. Directors: T. Walters and W. N. Howe. Secretary: Annie Walters. Regd. office: 91, Morley Street, Byker, Newcastle-on-Tyne, 6.

Graham Berrie, Ltd.—Registered 30th January. Capital £1,000. To acquire the business of an electrical contractor now carried on by Eric Graham Berrie at 1, The Highgate, Kenton, Newcastle-on-Tyne; and to carry on the business of electrical, wireless, television and general engineers, etc. Permanent directors: E. G. Berrie and Mrs. A. Berrie. Secretary: Alice Berrie. Regd. office: 1, The Highgate, Kenton, Newcastle-on-Tyne.

Increases of Capital

Humber Electrical Engineering Co., Ltd.—Increased by £29,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Automatic Telephone & Electric Co., Ltd.—Increased by £1,000,000, in £1 ordinary shares, beyond the registered capital of £2,560,000.

Trojan (Radiolectric), Ltd.—Increased by £13,000, in £1 ordinary shares, beyond the registered capital of £2,000.

Funditor, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £50,000.

Bankruptcies

L. E. Lawson, previously residing and carrying on business at 1, Northam Road, Six Dials, Southampton, under the name of Lawson's Radio as a radio and electrical engineer.—Last day for receiving proofs for dividend 12th February. Trustee, Mr. N. G. Randall, of Morgan & Co., 100, Park Street, Grosvenor Square, London, W.1.

S. F. Bent, 16, Chatsworth Road, Droylsden, Lancs, electrician, formerly carrying on business as S. F. Bent & Sons, electrical contractors, at 362, Ashton New Road, Bradford, Manchester.—Application for discharge to be heard on 27th February at Town Hall, Stalybridge, Ches.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 29th February.

C-H (design). No. 661,666. Class 9. Electrical apparatus included in Class 9 for use in controlling the flow of current to machines, engines and motors; and motor starters, being electrical switchgear (not parts of machines), lifting and separating magnets (electric), switches, rheostats, relays, contactors and switch and control panels, all for sale in the counties of Middlesex, Yorkshire, Gloucestershire, Northumberland, Staffordshire, Surrey, Hertfordshire, Wiltshire, Cheshire, County Durham, Essex, Oxfordshire, Northamptonshire, Lincolnshire, and in Wales and Scotland.—Cutler-Hammer, Inc., Milwaukee, Wisconsin, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

PHILCO. No. 663,865. Class 9. Testing and measuring instruments, frequency meters, oscilloscopes, experimental stills, electric signal generators, thermostatic controls for refrigerating and air conditioning apparatus, electric insulated wire and electric fuse wire, combined magnifying glasses and mirrors for use in scientific apparatus, apparatus for projecting motion pictures and slides, spring actuated measuring scales, thermometers, radio vacuum tube amplifying apparatus, intercommunication apparatus (electrical), radar apparatus, radio and television receiving and transmitting apparatus, sound reproducing and recording apparatus, radio and television aerials and electric vacuum cleaners, all sold complete; and electric batteries and parts included in Class 9.—Philco Corporation, Philadelphia, Pennsylvania, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

MAGNICON. No. 697,906. Class 9. Pick-up tubes, iconoscopes, monoscopes, and image-converter tubes, all being parts of television apparatus; and television cameras.—Cathodeon, Ltd., Meadowcroft Laboratories, Church Street, Cambridge.

FALCO. No. 699,535. Class 9. Electrically operated lighters for smokers.—L. C. Hillier, Ltd., Oldham Road, Rochdale, Lancs.

SIGNAFLEX. No. 702,405. Class 9. Electrical signalling apparatus and parts included in Class 9 for public service vehicles.—D. H. Bonnella & Son, Ltd., 46 and 48, Osnaburgh Street, Euston Road, London, N.W.1.

SEAMEC. No. 703,710. Class 9. Electrodes for arc welding.—Fusarc, Ltd., Bridgewater House, Cleveland Row, St. James's, London, S.W.1.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Wardray" cold-cathode lighting fittings.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

STOCKS and SHARES

STOCK Exchange markets are proceeding very quietly, enterprise and business being at somewhat low ebb. The cause is the uncertainty which persists in view of the early approach of the Budget. Bringing forward its usual date had the effect of imposing fresh restraint upon Stock Exchange activity, which is natural enough in view of the possibilities of fresh taxation and limitations. The market for British Government and other gilt-edged securities pursues a depressing course, the latest cause of which is the issue of a Southern Rhodesia 4½ per cent stock (full trustee) at 99. Since a week ago, there have been a number of fresh falls in prices of the stocks and shares dealt with in our monthly table. The present-day attitude of the investor is distinctly cautious.

New A.E.I. Shares

Dealings opened at the beginning of this month in the 2,218,000 new ordinary shares offered to shareholders of Associated Electrical Industries, Ltd. Early transactions were at a premium of 8s 9d on the issue price of 60s. These shares will not be entitled to the final dividend for 1951, due to be declared in March, but they rank equally with the old for the current year's distribution, which the company expects to maintain at a total of 20 per cent. After deduction of the value of the rights, the old shares were quoted at 71s 3d, which puts them on a prospective yield basis of £5 12s 2d per cent on money invested in them at that price. Payment in full for the new shares is required by 18th February. Their progress, meanwhile, is being watched as something of a test case.

Automatic Telephone Capital

Full details of the offer of new ordinary shares to present holders of the Automatic Telephone & Electric Company's ordinary and deferred stocks were to go out to-day (Friday). It will involve 544,000 new shares, to be offered at 45s in the proportion of two new shares for every five stock units held. Advance notice of this intention had been weighing on the shares some time before the appearance of these preliminary details, upon which the existing ordinary shares were quoted at 55s and the "B" deferred at 53s 9d. Rights to the issue seem certain therefore to be of substantial value, and to assure the success of the operation. Automatic Telephone dividends figure among the most conservative in the industrial market, last year's 15 per cent being covered by earnings of about 100 per cent. Ordinarily the shares stand, as a result, on a relatively low yield basis. In their "ex-rights" form the ordinary appear likely to offer about 5¾ per cent on the money, and the deferred a little more, on the reasonably safe assumption that the last rate of dividend will be continued.

E.M.I. Issue

Allotment letters for the offer of new 10s ordinary shares at 12s 6d by Electric & Musical Industries were in shareholders' hands a day or two before the reassembly of Parliament. They changed hands up to a premium of nearly 3s before the Chancellor's speech, part of which concerned particularly the domestic market for some of the group's products. This factor, coupled with the routine selling of "rights," reduced the premium to 2s 3d, and the old shares to 15s ex-rights, from which there was a prompt recovery to 3s 1¼d premium and 15s 9d respectively.

Market opinion about the prospects for E.M.I. shares, and for other leading enterprises in the same field, remains reasonably sanguine that the importance of their productions to both the export and defence programmes will take care of such slack as may appear in the home civilian sectors. There was some precautionary marking-down, rather than real selling, of shares concerned with the new restrictions on the manufacture and purchase of radio and television sets, refrigerators, vacuum cleaners and so on.

Week's Price Movements

Cable & Wireless ordinary, after its 7½ point rise on the increase in the dividend, lost 5½, going back to 119½. British Electric Traction deferred is 10 points down at 395. Hoover, 24s, and Cossor, 11s, reflect a little nervousness felt as to what may be the outcome of the Government's restriction upon hire-purchase transactions. Walsall Conduits, 48s 9d, and Murex, 49s, are 2s 6d lower. General Electrics at 80s 9d have fallen 1s 9d. A number of smaller falls have occurred in various sections while, on the other side of the sheet, Babcock & Wilcox, 68s 9d, are 2s 3d up. De la Rue, 29s 6d, show a gain of 9d, and Ever Ready, 27s, are 6d to the good.

Electrical Equipment Shares

Shares of the principal electrical engineering companies shifted their ground very little while the implications of the latest Government measures were being digested. Such appreciable movements as did occur were connected mainly with the lighter branches of the industry. Electrical shares on the top line seem to have reached a platform on which the buyer can see the respectable return of 5½ to 5¾ per cent on his money. Discussion runs on the possibility that the weight of new issues may, at least temporarily, exert further pressure on the general yield basis.

Unlicensed Television Receivers

Post Office Detection Methods

ON Monday last the General Post Office started a campaign in London to track down the users of unlicensed television receivers. The method of detection was developed at the G.P.O. Radio Experimental Laboratories at Dollis Hill and it works satisfactorily whether indoor or outdoor aerials are used. It is so sensitive that most working television receivers can be detected and their positions in houses accurately located. The equipment is simple to operate and with a little practice houses containing working receivers can be located while the van is moving.

An interesting side-light on this technique is that it also provides a means for assessing the popularity of a television programme by counting the number of receivers switched on in a given area.

The detection equipment uses the induction magnetic field set up by the line scanning coils of the television receiver. This field contains strong harmonics of the fundamental line scanning frequency of 10·125 kc/s and these can be picked up by a sensitive receiver at distances of up to 100ft or more.

Three horizontal loop aerials are used and tuned to the second harmonic of the line frequency (20·25 kc/s) and are mounted on the roof of the detector van in an "A" formation. The outputs of these loops can be switched in turn to the input of the radio receiver and the audible output can be heard on a loudspeaker or indicated on an audio level meter. By noting the relative levels of the signals from the three aerials the operator obtains a clear indication whether the television receiver is in front of, or behind, or to the right or left of the van. For example, when the van passes in front of a house on the side of the road containing a working television receiver the indications obtained from the fore and aft loop aerials are equal and that from the off-side loop aerial is weaker than that from the other two.

The strength of the induction magnetic field varies inversely as the square of the distances and this fact enables receivers even in adjacent houses to be separately detected. The brick walls of ordinary houses have little or no effect on the induction magnetic field at the relatively low frequency of 20·25 kc/s which is employed.

Gas Turbine Design

THE marine gas turbine from the view point of an aeronautical engineer is the subject of a paper contributed by Mr. A. Holmes Fletcher (chief designer, Marine Division, Rolls Royce, Ltd.) to the Institution of Mechanical Engineers, with the object of advocating the adoption of aero-design methods for the manufacture of gas turbines for ship propulsion and stationary power generation.

The paper reviews the more obvious features of various typical aircraft turbines from which the author concludes that multiple combustion systems with single-stage or two-stage turbines should be employed with the object of considerably reducing the mass of metal in an assembly as compared with extant stationary designs in order to reduce transient temperature stressing. The paper includes a description of an experimental heat exchanger embodying the principles of light scantlings, symmetry of design and purity of suspension.

A brief excursion by the author into performance calculations leads him to recommend a compound cycle of 8/1 overall compression ratio, which would involve the use of air-cooled blading. A service life of 10,000 hours appears to be within reach, which he considers to be adequate for merchant ship service.

An outline, with drawings, is included in the paper of a compactly arranged turbine of this type to provide 4,000 s.h.p. at an overall thermal efficiency of 30 per cent. In preference to an electrical transmission system, which is not favoured for reasons explained in the paper, the author suggests that manœuvring and reversing problems could be overcome by the employment of a variable pitch propeller, although this device would require further development to reduce its alleged tendency to greater losses as compared with those which we experienced with a fixed pitch type of propeller.

NEXT WEEK'S EVENTS

Monday, 11th February

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Centre. "The Sutton Coldfield Television Broadcasting Station," by P. A. T. Bevan and H. Page.

COVENTRY.—At the G.E.C. Telephone Works, Stoke, 5.30 p.m. I.E.E. South Midland Supply and Utilization Group. Lecture on "Modern Developments in Electric Welding," by Dr. H. G. Taylor.

KINGSBURY.—Prince of Wales Hotel, Kingsbury Road, N.W.9, 7.45 p.m. A.S.E.E. North-West London Branch. "Corrosion," by G. E. D. Redman.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on "Merit Rating and Job Evaluation," opened by J. J. Gracie.

St. Ermin's Hotel, Caxton Street, S.W.1, 7 p.m. A.S.E.E. Central London Branch. "Supervisory Remote Control of Electrical Supplies," by J. D. McNeil.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Domestic Electrical Installations: Some Safety Aspects," by H. W. Swann.

READING.—George Hotel, King Street, 7 p.m. Institution of Electrical Engineers. District meeting. "Applications of Electron Beams," by M. E. Haine.

Tuesday, 12th February

BELFAST.—Presbyterian Hostel, Howard Street, 6.45 p.m. I.E.E. Northern Ireland Centre. "The Design and Performance of Surge Diverters for the Protection of Alternating-Current Systems," by T. F. Monahan.

CARDIFF.—South Wales E.B. Demonstration Theatre, 5.45 p.m. I.E.S. Cardiff Centre. "Development of the Tungsten Lamp," by B. P. Dunning.

DERBY.—E.M.E.B. Service Centre, 6.30 p.m. I.E.E. East Midland Centre. "Domestic Electrical Installations: Some Safety Aspects," by H. W. Swann.

LEWISHAM.—South-East London Technical College, 8 p.m. A.S.E.E. South-East London Branch. Annual J. and P. Lecture, "Atomic Physics." (Joint meeting with the S.E. London Technical Institute.)

LONDON.—Central Hall, Westminster, S.W.1, 6.30 p.m. Institution of Electrical Engineers. Faraday Lecture. "Sound Recording—Home, Professional, Industrial and Scientific Applications," by Dr. G. F. Dutton.

At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers. "Some Applications of Cold Cathode Tubes in Switching Circuits," by J. A. Lawrence.

At the Royal Society of Arts, John Adam Street, W.C.2, 6 p.m. Illuminating Engineering Society. "Specification and Testing of Fluorescent Lighting Fittings and Components," by W. R. Bloxsidge, G. Fahey and D. T. Waigh.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "Inhibited Transformer Oil," by W. R. Stoker and C. N. Thompson. "The Stability of Oil in Transformers," by P. W. L. Gossling and L. H. Welch.

NEWPORT.—Tredegar Arms Hotel, 7 p.m. Newport and District Electric Club. "Some Pioneers of Electrical Science," by J. W. Elliott.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Control of Hydro-Electric Plant," by A. H. C. Frost and W. Brittlebank.

WIMBLEDON.—St. George's Hall, St. George's Road, 8.15 p.m. A.S.E.E. South-West London Branch. "Electric Arc Welding," by B. W. Silverwood.

WORCESTER.—Recreation Club Rooms, Hylton Road, 7 p.m. E.P.E.A. Midland Technical Group. "Superimposed Frequency Control Systems," by J. F. McKenzie.

Tuesday, 12th February, to Friday, 15th February

GLASGOW.—Kelvin Hall. Scottish Dairy Show.

Wednesday, 13th February

ABERDEEN.—Caledonian Hotel, Union Terrace. 7.30 p.m. I.E.E. North-East Scotland Sub-Centre, "The Protection of Electric Power Systems—A Critical Review of Present-Day Practice and Recent Progress," by H. Leyburn and C. H. W. Lackey.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Factory Maintenance Methods," by J. W. White.

CHELMSFORD.—Public Library. I.E.E. London Students' Section. District meeting. "Relaxation Methods and their Application to Field Problems," by C. J. Carpenter.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. "The London–Birmingham Television Radio-Relay Link," by R. J. Clayton, Dr. D. C. Espley, G. W. S. Griffiths and J. M. C. Pinkham. (Joint meeting with the Edinburgh Centre of the Institution of Post Office Electrical Engineers.)

Welfare Club Hall, City Lighting and Cleansing Department, 357, High Street, 7 p.m. I.E.S. Edinburgh Centre. "Outdoor Decorative Lighting," by H. Carpenter.

LANCASTER.—N.W.E.B. Demonstration Theatre, North Road, 7 p.m. I.E.E. North Lancashire Sub-Centre. "Some Notes on Electrical Installations in Large Chemical Factories," by D. B. Hogg.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "Factors Affecting the Design of the Automatic Electron Trajectory Tracer," by Dr. K. F. Sander, C. W. Oatley and J. G. Yates.

I.E.E. London Students' Section, 2.30 p.m. Visit to Brookman's Park Transmitter, Herts.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 2.30 p.m. Institution of Heating and Ventilating Engineers. Annual general meeting and presidential address. Savoy Hotel, 7.15 p.m. Annual dinner.

John Adam Street, Adelphi, W.C.2, 2.30 p.m. Royal Society of Arts. "Television Technique as an Aid to Observation," by Dr. J. D. McGee.

OXFORD.—S.E.B. Showrooms, 37, George Street, 7 p.m. Institution of Electrical Engineers. District meeting. "The Application of Gas Turbines to Electricity Supply," by E. B. Johnson.

(Continued on next page)

Wednesday, 13th February (*continued*)

SOUTHAMPTON.—Polygon Hotel, 6.30 p.m. I.E.E. Southern Centre. "Grain Drying by Electricity," by W. Cover.

Thursday, 14th February

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. "The Protection of Electric Power Systems—A Critical Review of Present-Day Practice and Recent Progress," by H. Leyburn and C. H. W. Lackey.

GLASGOW.—At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, 6.30 p.m. I.E.S. Glasgow Centre. "Brightness Engineering," by W. Robinson.

LEEDS.—B.E.A. Yorks Division, 1, Whitehall Road. E.P.E.A. West Yorkshire Technical Group. "Turbo-Jet Propulsion," by N. R. Chandler.

LEICESTER.—E.M.E.B. Demonstration Theatre, Charles Street, 6.30 p.m. I.E.S. Leicester Centre. "Lighting of the *Queen Elizabeth* and *Caronia*," by T. Catten.

LIVERPOOL.—Electricity Showroom, Whitechapel, 7 p.m. E.P.E.A. Merseyside Technical Group. "Switchgear Development," by J. A. F. Harvey.

LONDON.—Caxton Hall, Westminster, S.W.1, 6 p.m. Engineers' Guild. Debate on "That this meeting considers that Nationalization of Industry does not adversely affect the status of the Professional Engineer."

Management House, 8, Hill Street, Berkeley Square, W.1, 7 p.m. Institute of Industrial Administration (London Centre). "Management in Practice, No. 6, Productivity and Management," by R. P. G. Kirchem.

MANCHESTER.—Town Hall Extension, 6 p.m. I.E.S. Manchester Centre. "Lighting and Vision in Advancing Age," by H. C. Weston.

SWANSEA.—Central Public Library, 6 p.m. I.E.E. West Wales Sub-Centre. "Some Notes on Electrical Installations in Large Chemical Factories," by D. B. Hogg.

Friday, 15th February

BELFAST.—Grand Central Hall. I.E.E. Northern Ireland Centre. Annual conversazione and visit of President.

LONDON.—Connaught Rooms, Great Queen Street, W.C.2, 12.15 for 1 p.m. Electrical Trades Commercial Travellers' Association. Annual luncheon.

39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. Informal meeting. "Recent Developments in Arc Welding Electrodes," by D. H. Young.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.30 p.m. I.E.E. North Eastern Students' Section. Joint meeting with Students' Sections of I.C.E. and I.Mech.E.

County Hotel, 7 p.m. I.E.S. Newcastle Centre. Annual dinner and dance.

NOTTINGHAM.—Electricity Showrooms, Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "Electronic Control in Engineering," by K. J. Martin.

PORTHCAWL.—Seabank Hotel, 6.30 for 7 p.m. I.E.E. Western Centre. Annual dinner and dance.

STREET LIGHTING NOTES

DUDLEY is to send a deputation, led by the mayor, to the Ministry of Transport, to protest against the delay in sanctioning the town's new £15,000 street lighting scheme. The Town Council was told that the contractor had been ready to install "shadowless" lamps in the main highways since 14th November, but the Ministry had not given permission to proceed.

LARGS Town Council (Ayrshire) is to install fluorescent and sodium lighting on the main road in the burgh at a cost of £5,945.

Sodium lighting, estimated to cost £16,000, is to be installed at DONCASTER along a 4-mile stretch of the North Road between the Doncaster boundary and Red House Corner. Bentley and Adwick U.D.C.s and Doncaster R.D.C. will share the cost.

The borough engineer of JARROW has been asked to report on the cost of installing modern electric lighting in the older part of the town. Although streets on the new housing estates are lit by electricity, those in the old part of the town have gas lighting.

CHARD Town Council has agreed to accept the scheme submitted by the South West Electricity Board, for lighting all county and district roads in the town by electricity and to forward it to the Ministry of Transport. The scheme provides for 158 lighting points, 53 concrete standards and pole brackets on class A roads; five wall brackets and 39 pole brackets on other roads. The capital cost of installation is £7,530.

The question of street lighting at COLWYN BAY is to be discussed by the borough engineer with the Ministry of Transport, following his submission of a scheme to the Highways Committee for improved lighting on the main road.

BLYTH Corporation is recommended to approve a scheme for the conversion from gas to electricity, of street lighting in the town at an estimated cost of £5,600.

SCARBOROUGH Corporation has deleted from its annual estimates a scheme submitted by the Water and Streets Committee for new street lighting in Marine Drive, Scarborough, to cost about £12,000.

CHERTSEY Urban District Council has agreed in principle to the adoption of electric street lighting in place of gas. The cost of £26,932 will be spread over a period of ten years.

GATESHEAD Town Council has received sanction to borrow £26,250 for improved lighting.

Group A lighting to be extended to additional streets in the centre of CHESTERFIELD at an estimated cost of £3,476.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 19th March from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

2[illegible]. Sigrist, W.—Photometers and like photo-electric instruments. 9th August, 1946. (Convention date not given.) (668362.)

1947

2[illegible]7. Sperry Gyroscope Co., Inc.—Electric signal mixing circuits. 24th October, 1947. (Cognate application 285[illegible] 28th December, 1946.) (668462.)

2[illegible]56. Standard Telephones & Cables, Ltd., and Williams, O. G.—Electronic devices. 5th November, 1948. (668[illegible].)

1948

9506. Mitchell, W. H.—Magnetic fluxmeters. 4th April, 1949. (Cognate application 33093, 22nd December, 1948.) (668368.)

10188. Compagnie Industrielle des Téléphones.—Device for the retransmission of signals for a telephone line with two wires. 15th April, 1948. (668369.)

15300. Standard Telephones & Cables, Ltd., and Beck, A. H. W.—Electron-discharge devices. 7th June, 1948. (668725.)

16157. James, I. J. P.—Beam deflecting circuits for cathode-ray tubes. 15th June, 1949. (668726.)

18203. Broadway, L. F.—Electron-discharge devices. 22nd June, 1949. (668727.)

19641. Compagnie Industrielle des Téléphones.—Signalling-current amplifying arrangement for two-wire telephone lines. 22nd July, 1948. (668370.)

21105. Marconi's Wireless Telegraph Co., Ltd., and Cooper, V. J.—Television and like transmitters. 2nd June, 1949. (668728.)

21739. Semeraro, A.—Method and equipment for the production in situ of structures formed of concrete or other mouldable material having cast therein channels and cavities for electric and fluid installations. 17th August, 1948. (668626.)

23121. Analyte Instruments, Inc., and Smith, W.—Manufacture of electric discharge lamps. 2nd September, 1948. (668729.)

25006. Standard Telephones & Cables, Ltd., Gayford, M. L., and Ballard, L. J.—Microphone stands. 24th September, 1948. (668730.)

28147. Metropolitan-Vickers Electrical Co., Ltd., and Walley, J. W.—Magnetic detection of faults in magnetic material. 22nd September, 1949. (668732.)

28602. Johansson, K. L.—Electronic indicating or warning apparatus. 3rd November, 1948. (668374.)

30231. International Business Machines Corporation.—Electronic counter. 20th November, 1948. (668733.)

1949

416. Postmaster General.—Alternating current signalling systems. 17th March, 1950. (668629.)

567. Radio Corporation of America.—Picture signal generating systems. 7th January, 1949. (668545.)

855. Benjamin Electric, Ltd., and Campbell, H. G.—Reflectors for electric light fittings. 12th January, 1950. (668380.)

2458. Metropolitan-Vickers Electrical Co., Ltd.—Electrical computing apparatus. 19th January, 1950. (668381.)

3560. British Thomson-Houston Co., Ltd., and Choudhury, S. U. A.—Apparatus for synchronizing a.c. machines. 30th January, 1950. (Addition to 658965.) (668386.)

5119. Primavesi, D.—Process for the electrolytic production of copper in powder form. 28th February, 1949. (668470.)

8671/2. Marconi's Wireless Telegraph Co., Ltd.—Piezo-electric crystal oscillators. 7th and 10th February, 1950. (668391 and 668635.)

8771. Western Electric Co., Inc.—Signalling systems employing travelling wave discharge apparatus. 31st March, 1949. (668554.)

9076. English Electric Co., Ltd.—Electric motor control systems. 23rd March, 1950. (668636.)

10192. Philips Electrical, Ltd.—Circuits for automatic frequency correction. 14th April, 1949. (Cognate application 10193, 20th September, 1948.) (668558.)

10591. English Electric Co., Ltd.—Studs or the like for use in the process of stud welding. 31st March, 1950. (668395.)

11800. Soc. Industrielle de Fournitures pour l'Electrolyse S. I. F. E.—Apparatus for the treatment of articles in a liquid, in particular for electrolysis. 3rd May, 1949. (668396.)

13337. Electric & Musical Industries, Ltd.—Circuits for mixing the outputs of a pair of oscillators. 19th May, 1950. (668398.)

13617. Sanders & Co. (Wednesbury), Ltd., W., Bayliss, G. H., and Manion, E. B.—Means for connecting together electric cables. 22nd May, 1950. (668399.)

14260. Harmer, H. M., and Cook, F. J.—Voltage-regulating arrangements. 28th August, 1950. (668641.)

14983. Electric & Musical Industries, Ltd.—Circuits embodying cathode potential stabilized picture signal generating tubes. 15th May, 1950. (668643.)

16119. Metropolitan-Vickers Electrical Co., Ltd.—Arc-welding of metal studs. 15th June, 1950. (668402.)

16810. Westinghouse Electric International Co.—Electric motor control systems. 24th June, 1949. (668404.)

17483. Metropolitan-Vickers Electrical Co., Ltd.—Accelerometers responsive to mechanical movements. 11th May, 1950. (668406.)

19367. English Electric Co., Ltd.—Safety releasing devices for wringers. 23rd June, 1950. (668414.)

19876. British Thomson-Houston Co., Ltd.—Interrupting units for electric circuit breakers of the oil blast type. 28th July, 1949. (668650.)

20811. Stone & Co., Ltd., J., and Nixon, L. R.—Electromagnetic carbon-pile regulators. 31st July, 1950. (668416.)

21242. Abbey, A. (American Optical Co.).—Means for and methods of altering the frequency of piezo-electric crystals. 15th August, 1949. (668652.)

23322. Hunt, Ltd., A. H.—Electrical capacitors. 5th September, 1950. (668425.)

25032. British Insulated Callender's Cables, Ltd., and Brazier, L. G.—Electric cable suitable for high-voltage. 28th September, 1950. (668743.)

26070. Automatic Telephone & Electric Co., Ltd.—Circuit arrangements for generating impulse patterns. 19th September, 1950. (668430.)

29082. British Thomson-Houston Co., Ltd.—Electron-discharge amplifiers. 14th November, 1949. (668436.)

30489. G.W.B. Electric Furnaces, Ltd.—Temperature control apparatus for electrode type boilers. 15th November, 1950. (668661.)

31253. Standard Telephones & Cables, Ltd.—Variable Inductance elements. 1st December, 1950. (668752.)

32050. British Insulated Callender's Cables, Ltd., and Gray, D. J.—Joints and terminations for metal sheathed internal-pressure electric cables. 13th December, 1950. (668753.)

32545. Radio Corporation of America.—Automatic gain control system for radio receivers. 19th December, 1949. (Cognate application 32546, 29th December, 1948.) (668756.)

33485. Lucas, Ltd., J.—Electric welding machines. 19th December, 1950. (668662.)

1950

145. Dehn, S. G. (Louis Allis Co.).—Electric motor construction. 3rd January, 1950. (668482.)

216. Du Mont Laboratories, Inc., A. B.—Electronic circuit voltage control. 4th January, 1950. (668762.)

1003. Winther, M. P.—Dynamo-electric apparatus. 16th January, 1950. (668441.)

1561. Western Electric Co., Inc.—Arrangements for reducing distortion in electric signals. 20th January, 1950. (668491.)

2481. Babcock & Wilcox, Ltd.—Pulverizing mills. 31st January, 1950. (668775.)

2738. Sperry Corporation.—Pulse synchronizing apparatus. 2nd February, 1950. (668777.)

3581. General Electric Co., Ltd., Cornell, W., and Puckette, jun., C. C.—Electromagnet and spark quench assemblies. 15th December, 1950. (668672.)

3613. Philips Electrical Industries, Ltd.—Superheterodyne radio receivers. 13th February, 1950. (668498.)

3760. Philips Electrical Industries, Ltd.—Video detector circuits for television. 14th February, 1950. (668676.)

3800. Soc. Facine.—Device for automatically adjusting illuminations. 14th February, 1950. (668581.)

4047. Mahr, C.—Precision dial gauge having electrical contacts. 16th February, 1950. (668679.)

4122. Singer Manufacturing Co.—Machines for seaming dielectric sheet material. 17th February, 1950. (668680.)

4332. Pittsburgh Reflector Co.—Luminaires. 20th February, 1950. (668500.)

4434. British Thomson-Houston Co., Ltd.—Waveguides. 21st February, 1950. (668782.)

4509. Tichelly, L. J.—Electric pulley blocks. 22nd September, 1950. (668584.)

4811. Philips Electrical Industries, Ltd.—Electric lighting fittings. 24th February, 1950. (668785.)

4975. Radio Corporation of America.—Television signa control system. 27th February, 1950. (668786.)

5077. Hamilton, W. S. H.—Starting and operating circuits for fluorescent electric lamps. 28th February, 1950. (668587.)

5315. Sperry Corporation.—Transmission line systems and particularly in standing wave detectors therefor. 2nd March, 1950. (668590.)

5367. Olland, F. W. (trading as Commanditaire Vennootschap Snelwegerfabriek Olland).—Electrically driven meat-cutting machines. 2nd March, 1950. (668788.)

5834. Electric Storage Battery Co.—Terminal for an electric storage battery. 8th March, 1950. (668591.)

7332. United-Carr Fastener Corporation.—Sockets for electric lamps or similar electrical devices having a threaded connecting base. 23rd March, 1950. (668798.)

8045. Standard Telephones & Cables, Ltd.—Electric discharge devices. 30th March, 1950. (668443.)

8989. Allmanna Svenska Elektriska Aktiebolaget.—Means for the control of illumination of electric lamps, employing transductors. 12th April, 1950. (668447.)

9181. Benham, D. R.—Automatic gravity-actuated electrical switching device for use with gearless variable-ratio motive power transmission system. 14th April, 1950. (668449.)

9381. British Thomson-Houston Co., Ltd.—Freezing trays for refrigerators. 17th April, 1950. (668684.)

9833. Chambersburg Engineering Co.—Time switching systems for inductive electric circuits. 21st April, 1950. (668501.)

10080. Babcock & Wilcox, Ltd.—Vapour generating and superheating units. 24th April, 1950. (668504.)

10421. Du Pont de Nemours & Co., E. I.—Electrolytic cell. 27th April, 1950. (668691.)

10657. Allmanna Svenska Elektriska Aktiebolaget.—Means for charging electric batteries. 1st May, 1950. (668505.)

10757. Dutilh, J. R. H.—Multi-channel telemetering device. 2nd May, 1950. (668453.)

10801. British Thomson-Houston Co., Ltd.—Mechanism for adjusting shaft end play. 2nd May, 1950. (668454.)

11514. Westinghouse Electric International Co.—Electrical dust precipitators. 9th May, 1950. (668638.)

11521. Standard Telephones & Cables, Ltd.—Cavity resonators. 9th May, 1950. (668508.)

11666. Steatite Research Corporation.—Ceramic magnetic material with a small temperature coefficient. 10th May, 1950. (668699.)

11667. Steatite Research Corporation.—Ceramic magnetic materials with high-saturation flux density. 10th May, 1950. (668700.)

13264. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Television or like systems. 26th May, 1950. (668512.)

13300. Sperry Corporation.—High-frequency coupling devices. 26th May, 1950. (668513.)

13421. Brightside Plating Co., Ltd., and Neale, K. F.—Anodes used in connection with electro-plating mechanism. 30th May, 1950. (668514.)

14190. Sulzer Freres Soc. Anon.—Regulation of gas turbine plants. 7th June, 1950. (668516.)

14335. Philips Electrical Industries, Ltd.—Electric discharge tubes. 8th June, 1950. (668707.)

14885. Philips Electrical Industries, Ltd.—Electric phase shifting circuit arrangements. 14th June, 1950. (668708.)

16085. Holth, O.—Push-button electric contact devices. 28th June, 1950. (668599.)

19178. Standard Telephones & Cables, Ltd.—Electric discharge tubes and circuits therefor. 1st August, 1950. (668802.)

19306. British Thomson-Houston Co., Ltd.—Preparation of fluorinated organic compounds. 2nd August, 1950. (668609.)

20891. British Thomson-Houston Co., Ltd.—Clothes washing machines. 23rd August, 1950. (668616.)

21951. Philips Electrical Industries, Ltd.—Discharge tubes comprising a resonant cavity adapted to be excited by an electron beam of annular cross-section. 6th September, 1950. (668806.)

23329. Maschinenfabrik Oerlikon.—Plate-type electrode for electrolysers. 22nd September, 1950. (668618.)

23445. British Thomson-Houston Co., Ltd.—Refrigerators. 25th September, 1950. (668458.)

25581. Westinghouse Electric International Co.—Dynamo-electric machines. 20th October, 1950. (668815.)

29078. Hoover, Ltd.—Suction cleaners. 28th November, 1950. (668819.)

30533. British Thomson-Houston Co., Ltd.—Refrigerating systems. 14th December, 1950. (668720.)

1951

5001. Compagnie Industrielle des Téléphones.—Calling signal retransmission device for two-wire telephone line. 15th April, 1948. (Divided out of 668369.) (668460.)

Amended Specification

642668. British Thomson-Houston Co., Ltd.—Glass-to-metal seals.

Electronics Course at Harwell

PHYSICISTS and engineers who wish to obtain specialized knowledge of electronic instruments used in nuclear physics, radiochemistry and work with radioisotopes, are being offered a week's course at the atomic energy research establishment, Harwell. The number that can be accepted for the course, which begins on 19th May, is limited to twelve, but if there is sufficient demand, further courses will be arranged.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—MELBOURNE.—19th March. State Electricity Commission of Victoria. Supply of vulcanized rubber insulated control cable. (C.R.E. 3275/52. Ten/3543.)*

Brazil. — PORTO ALEGRE. — 3rd March. Ministry of Public Works. Construction and equipment of a 20,000 kW power station at Candiota. (C.R.E. 1903/52. Ten/3533.)*

Cheadle and Gatley.—3rd March. U.D.C. Street lighting stores for one year. (See this issue.)

East Riding.—19th February. County Council. Supply of electric lamps. Supplies officer, County Hall, Beverley.

Enfield.—16th February. Group Hospital Management Committee. Supply of electric lamps for one year from 20th April. Supplies officer, Chase Farm Hospital.

Gateshead.—25th February. Corporation. Electrical installation at St. Cuthbert's Controlled School. (See this issue.)

Gravesend.—18th February. Corporation. Rewiring of the municipal offices and supply of certain electrical equipment. (See this issue.)

Greece.—ATHENS.—16th February. Greek Social Insurance Institute. Supply of three complete X-ray units. (C.R.E. 2742/52. Ten/3540.)* 1st March. Supply of fourteen electrocardiographs and accessories. (C.R.E. 1920/52. Ten/3551.)*

India. — ORISSA. — 17th April. Electricity Department, Government of Orissa. Switchgear, transformers and substation equipment for the new Duduma transmission system. (C.R.E. 3448/52. Ten/3561.)*

King's Lynn.—18th February. Borough Council. Supply of electric lamps for one year. Borough surveyor, 27, Queen's Street.

New Zealand.—AUCKLAND.—17th March. Auckland Electric Power Board. Supply of 3,500 yards of pilot cable and accessories. (C.R.E. 3392/52. Ten/3544.)*

WELLINGTON.—10th June. State Hydro-Electric Commission. Supply of one 3,750 kVA, 66/11, 25 kV transformer bank for Motupipi substation. (C.R.E. 3290/52. Ten/3552.)*

22nd April. State Hydro-Electric Department. Steel-cored aluminium transmission line conductor and accessories. (C.R.E. 3286/52. Ten/3556.)*

Pakistan. — KARACHI. — 27th February. Department of Supply and Development. One indoor type 250 kVA transformer. (C.R.E. 4124/52. Ten/3560.)*

Seaham (Durham).—12th February. U.D.C. Electrical work in 36 houses on Westlea estate. Clerk to the Council, Cliff House, Seaham.

Seaton Valley (Northumberland).—U.D.C. Electrical installations in 18 houses on Blyth Street estate. Surveyor, Council Offices, Seaton Delaval, Northumberland.

South Africa. — JOHANNESBURG. — 20th February. South African Railways. Supply of 200 telephone mouthpieces and 100 main winding springs for morse telegraph recording instruments. (C.R.E. 2827/52. Ten/3542.)*

Sunderland. — 22nd February. Electrical installation in new R.C. school at Grindon. Matkin and Hawkins, Barclays Bank Chambers, Fawcett Street.

Tynemouth. — 25th February. Borough Council. Supply of electric lamps, cable, lamp columns and reflectors for one year. D. M. O'Herlihy, borough surveyor, 16, Northumberland Square, North Shields.

ORDERS PLACED

London.—ISLINGTON.—Housing Committee. Recommended. Supply of 202 20 gall u.d.b. electrically operated water heaters (£34 3s each inclusive of purchase tax and a 10 per cent handling charge).—London Electricity Board.

Northwich.—U.D.C. Electrical installations in 50 houses on the Leftwich estate.—J. Harrison.

Shepshed.—U.D.C. Electrical installations in houses at the Glenmore, Leicester Road and Oakley estates (£2,304).—M. & W. Smithers.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashby.—Houses (50), Ravenslea estate; R.D.C. architect, Ashby, Leics.

Ballymena.—Secondary school for St. Louis Convent; P. B. Gregory, architect, 25, Gresham Street, Belfast.

Builth Wells.—Catholic Church; T. Edmund Rees, architect, The Grove, Merthyr Tydfil.

Cardiganshire. — Primary school; Gee, Walker & Slater, Ltd., Uttoxeter Old Road, Derby.

Carlisle.—Crematorium; L. J. A. Stow, city engineer, 16, Fisher Street.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Crediton.—Houses (24), Spruce Park; F. W. Beech & E. Curnow Cooke, architects to U.D.C., 15, Dix's Field, Exeter.

Deal.—Flats (36), Orchard Avenue estate; borough surveyor, Municipal Offices, Queen Street.

Durham.—Technical colleges at Durham City and Easington and infants' school at Peterlee; county architect, Court Lane, Durham.
Houses (250) for R.D.C.; K. G. Millar, surveyor, Byland Lodge, Durham.

East Ham.—Secondary school for girls (£264,982); B. Sunley & Sons, Ltd., builders, 34, St. James's Street, London, S.W.1.

Eston.—Houses (134), Redcar Road East estate; U.D.C. surveyor.

Golborne.—Home for aged at Derby Road; county architect, Preston.

Hastings.—Out-patients' department, Royal East Sussex Hospital; Benjamin Stevens & Partners, architects, 49, Havelock Road.

Henley.—Houses (26), on five sites, for R.D.C.; surveyor, Council Offices, Hart Street.

Hereford.—New factory buildings for Painter Bros., Ltd.; Wilson Lovatt & Sons, Ltd., 16, Grosvenor Crescent, London, S.W.1.

Hook Norton.—Fire station for Oxon. C.C.; county architect, 3, Becket Street, Oxford.

Ilkley.—Three-storey teaching block, and hall, College of Housecraft; county architect, Bishopgarth, Westfield Road, Wakefield.

Leeds.—Erection of Cockridge C.P. School; Gribbon & Foggitt, architects, 3, Park Place, Leeds.

Liverpool. — Works extensions; Superfine Furniture, Ltd., Hillfoot Road, Speke.
R.C. junior school, Speke; J. C. Prestwich & Son, architects, Bradshawgate Chambers, Leigh, Lancs.

Llanidloes.—Works extensions; John Mills & Co. (Llanidloes), Ltd., Railway Foundry.

London.—FINSBURY.—Flats (180), Old Street, E.C.1; J. Emberton, architect, Chantry House, Buckingham Palace Road, S.W.1.
SOUTH NORWOOD.—Laboratories and classrooms at Lady Edridge Grammar School, Clifton Road; C. T. Ayerst, architect, 38, High Street, Croydon.

Luton.—Rebuilding part of factory; Lye & Sons, Ltd., New Bedford Road.

Manchester. — Works extensions, Colliery Street; Hardman & Holden, Ltd., Canal Street.
Engineering factory for T. C. Thompson, Ltd.; D. Walton, Ltd., Salford.

Mansfield Woodhouse.—Works extensions; N. J. Muschamp & Co., Grove Street works.

Mickleover (Derby).—Central main kitchen, central garage and repair depot, and accommodation for domestic staff, Pastures Hospital; E. F. Wilson, architect to Sheffield Regional Hospital Board, Old Fulwood Road, Sheffield.

Northfleet.—Houses (32), Coldharbour Road; North Kent Construction Co., Ltd., White Hart Road, Orpington.

Norwich.—Extensions to factory; J. Culyer & Son, Ltd., leather dressers, etc., Duke Street.

Old Fletton (Hunts).—Further 20 houses on Southfields estate for U.D.C.; Southfields Estates, Ltd., Old Fletton.

Ormskirk.—New ward units at County Hospital; Wm. Moss & Sons, Ltd., Roscoe Street, Liverpool.

Oswaldtwistle.—Houses (20) at Grove Street site; U.D.C. surveyor.

Poole.—Houses (90) for T.C.; Rawlings (Builders), Ltd., Harbour Road, Hamworthy.

Portsmouth.—Flats (63), King's Road, Southsea; city engineer, 1, Clarence Parade, Southsea.
Factory, Fratton industrial estate; McMurdo Instrument Co., Ltd., 145, London Road, Kingston-on-Thames.

Pwllheli.—Houses (25), Churton estate; borough surveyor.

Reading.—New Offices, Abbey Street and Abbots Walk, for Berkshire C.C.; county architect, Parkside Road, Reading.

Reigate.—First section of Gatton school (£33,866); county architect, County Hall, Kingston-on-Thames.

Salford.—Rebuilding of fire destroyed Salford Palace Cinema, Cross Lane; Brennan's Cinemas, Ltd., Deansgate Cinema, Manchester.

Slough.—Blocks of flats, Priory estate, Burnham; N. T. Berry, town clerk, Town Hall.

Southampton.—Offices for Halifax Building Society, Ltd.; R. H. Hammond, Ltd., builders, Winchester Road.

Sunderland.—Junior school and kitchen and dining room at Grindon; borough architect, Grange House, Stockton Road.

Thorney.—Houses (20), Park Farm estate; U.D.C. architect, Thorney, Cambs.

Tiverton.—Primary school, Elmore, for Devon C.C.; Nicks Bros., builders, Beacon Works, Bradninch.

Todmorden.—Reconstruction of weaving shed at Vale Mill for H. Walton & Sons, Ltd.; Cooper & Groom, architects, 37, King Street West, Manchester.

Twickenham. — Crematorium, Hounslow Road (£50,000); J. L. Denman, architect, 27, Queens Road, Brighton.

Wallsend.—Multi-storeyed flats, Willington Quay; borough surveyor, Town Hall.

Walsall.—Development of new estate at Gipsy Lane to provide for some 1,300 houses; M. E. Habershon, borough surveyor, Council House.

Wembley. — Factory extensions; Clearex Products Manufacturing Co., Spring Works, Heather Park Drive.

West Bromwich.—Extensions to factory at Guns Lane for S. E. Wakelein & Co., Ltd.; J. A. Harper & Son, architects, Union Chambers, 63 Temple Row, Birmingham.

Whitby.—Conversions at Princess Royal Hotel, for county home; North Riding county architect, County Offices, Northallerton.

Wigan.—Additional factory buildings for Turner's Asbestos Co., Ltd.; Grenfell Baines Group, architects, Guildhall Street, Preston.